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ABSTRACT

One-hundred thirty-two projects concerning technical aids for the speech handicapped are summarized as a result of an international survey of 270 institutions. Introductory tables allow access to projects by diagnosis (type of speech impairment such as stuttering or aphasia laryngectomy) or type of technical aid (such as communication boards or speech output devices). Usually provided for each project are the title, the principle investigator (name, institution, and address), type of study, type of speech defect, project result, manufacturer's name and address, and brief comments. A listing of participating institutions arranged alphabetically by countries is appended. (DB)

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Technical aids for the speech-impaired

An international
survey on research
and development projects

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The Swedish Institute for the Handicapped

ICTA Information Centre Stockholm 1978

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Technical aids for the speech impaired—an international survey on research and development projects

Background

Persons who for different reasons are unable to speak or who have their speech capacity impaired live at risk of being excluded from participation in society and to lead a life of passiveness and isolation.

In many cases a satisfactory degree of rehabilitation or habilitation can be achieved as a result of treatment and training. In other cases a need of assistive communication systems, e. g. technical aids can be said to exist. Despite the fact that it is known that technical aids for communication are being developed in several parts of the world, the speech-impaired have at present very limited access to such aids that may compensate their handicap.

With regard to the fact that the speech-impaired have considerably different needs depending upon the nature of their impairment, the number of persons in each group in need of a certain type of technical aids is relatively small. This fact gives difficult consequences when possible products later are to be put into production.

The above mentioned circumstances make it desirable that a coordination of the resources is achieved on an international basis. Therefore a project on technical aids for the speech-impaired has been initiated by the Swedish Institute for the Handicapped in collaboration with the International Commission on Technical Aids, Housing and Transportation (ICTA), one of the standing commissions of Rehabilitation International (RI). The project was started in early 1975 with financial support from The Swedish Board for Technical Development and was calculated to run over three years.

The aims of the project have among other things been to obtain and distribute information on research and development activities in various parts of the world and to provide information about existing technical aids, thereby making it possible for the speech-impaired to obtain these aids.

By promoting contacts between research workers in different countries it is hoped that the prerequisites for co-operation between nations will increase and as a consequence the possibilities for production and marketing of well-needed technical aids for the speech-impaired will be enhanced.

First Survey

In the autumn 1975 the first step of an international survey on projects concerning technical aids for people with speech defects was carried out. Questionnaires were sent to 257 different institutions all over the world, and in January 1976 answers had been received from 176 institutions. 43 of the respondents stated that no specific activities concerning technical aids for people with speech defects were carried

out or had been carried out. 133 of the respondents stated present, past and/or planned activities in the area.

The first survey included a) statistical and need analysis studies, b) basic studies of speech defects, c) studies aiming at development of methods and instruments for diagnosis, d) methods and instruments for training and e) studies aiming at development of personal aids.

A compilation of the answers was forwarded to the respondents in early 1976.

Second Survey

The second survey which is reported in this publication was carried out in 1976/77. The aim has been to receive more detailed information regarding some of the project activities relevant in the first survey, namely studies aiming at development of personal aids. Questionnaires have been sent to 270 different institutions. Answers have been received from 103 institutions/organizations with descriptions of 132 different projects.

Results

The results of the second survey are presented as a compilation of the answers received. Many respondents have enclosed reports, documents, reprints etc. A description of these items together with bibliographic data has been given on each questionnaire under the heading of Documentation.

The original intention was to make a survey on projects concerning technical aids for personal use by speech impaired persons. Nevertheless answers describing diagnostic tools or instruments for treatment and training have been included. However, answers describing the development of a *method* for treatment or training (e. g. a surgical technique) have *not* been included.

The answers have been arranged nationwide in alphabetic order. The answers from the United States have also been arranged in alphabetic order within each state.

A list of participating institutions can be found as an Appendix at the end of the report.

To facilitate the reading of the material two tables have been made where the responses have been arranged into clusters according to the contents of each response.

Table 1 comprises responses that describe technical aids for improvement of the individual's own speech. Table 2 comprises responses regarding technical aids as an alternative mode of communication for the speech impaired person.

Table 1. Technical aids for improvement of the individual's own speech (incl diagnostic instruments). Figures refer to project numbers

Diagnosis—type of speech impairment	Project No.
Nonspecific & general	5, 35, 73, 87, 104, 112, 113, 114, 121
Stuttering	17, 38, 47, 48, 53, 54, 55, 56, 84, 96, 111
Articulation disorders—general	7, 41, 43, 44, 67, 89, 98
Cleft palate; Velar insufficiency	37, 41, 52, 71, 74, 85, 97, 98
Glossectomy	31, 92, 109
Dysarthria	5, 15, 16, 67, 80, 90, 124
Voice disorders—general	8, 9, 15, 16, 18, 34, 36, 44, 58, 60, 62, 67, 112
Laryngectomy; Insufficient vocal intensity	30, 37, 39, 52, 63, 64, 82, 88, 91, 93, 108, 109, 115, 116
Aphasia	67, 130
Hearing impairment	6, 11, 15, 16, 20, 23, 24, 25, 26, 27, 28, 29, 40, 41, 42, 43, 44, 46, 50, 52, 69, 72, 73, 81, 86, 94, 95, 99, 104, 105, 121, 122
Delayed speech & language development	7, 83, 123
Mental retardation	7, 32, 33, 80, 86, 123

Table 2. Responses regarding technical aids as an alternative mode of communication. Figures refer to project numbers

Type of technical aid	Project No.
Symbol systems; Codes; Gesture languages;	10, 27, 70, 107, 110
Communication boards; Pointer displays; Picture boards;	3, 4, 57, 79, 117, 118, 119, 125, 127, 128, 129
Portable writing devices	49, 75, 77, 125, 127
Stationary writing devices	13, 59, 61, 68, 120, 126, 131
Signalling devices; Alarm systems	51, 107
Technical aids for non-vocal communication by telephone	14, 22
Speech Output Devices	12, 19, 45, 65, 66, 78, 100, 101, 102, 103, 106, 132
Other	3, 21, 76
Interface systems;	1, 2, 101, 102, 103, 107, 125, 127

Acknowledgement

We want to thank Mrs Elisabet Tenenholtz, Speech Pathologist, who has helped us classify the material and thereby has contributed significantly to the preparation of this catalog.

Stockholm 1977-12-31

Project No. 1

Title of project:

Standardised Modular Input Switching Systems

Principal investigator:

Centre Industries
Allambie Road
Allambie Heights 2100,
N.S.W., Australia
Neil McLeod

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in Jan. 1976

Type of speech defect:

Severely handicapped cerebral palsied preschool/adult

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Manufacturer's name and address:

As above

Comments:

Designed and manufactured for use in our own organization. Planned to enable cerebral palsied preschool and older patients use an unlimited variety of toys, motor planning and audio visual aids, communication and self help devices and signals, via a supermarket shopping list of standardised input switches, selected to meet the needs of the individual.

Switches are made in a variety of sizes from 10" x 10" to push button and in modules of 1 X, 2 X, 4 X, 5 X, light beam and scanners.

Project No. 2

Title of project:

System 80 Modular Switches

Principal investigator:

Centre Industries
Allambie Road
Allambie Heights, 2100
N.S.W., Australia
Neil McLeod, Managing Director

Type of study:

Development of instruments for training
Development of instruments for diagnosis

Type of speech defect:

Severely handicapped preschool/school/adult

Project result:

The project has resulted in a technical aid/instrument

Industrial production or market introduction is not planned

Manufacturer's name and address:

As above

Comments:

Modular switches to enable the Borg Warner System 80 Teaching machine to be controlled by a cerebral palsied child too handicapped to be able to use the standard machine controls. Drawings available.

Project No. 3

Title of project:

Vanian I Communication and Teaching Aid

Principal investigator:

Centre Industries
Allambie Road
Allambie Heights, 2100
N.S.W., Australia
Neil McLeod, Managing Director

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project is presently going on, and is estimated to be completed in May 1977

Type of speech defect:

Severe cerebral palsied

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Manufacturer's name and address:

As above

Comments:

A programmable learning machine with five columns of selective answers indicated through a semitransparent program overlay with red and green individual response indicating LED lights indicating correct and erroneous answers and ten successive problem steps vertically. Programmed by teacher by chinagraph pencils on software overlay and plugboard to program correct responses required. Drawings available.

Project No. 4

Title of project:

Communication Matrix Device

Principal investigator:

Centre Industries
Allambie Road
Allambie Heights 2100
N.S.W., Australia
Neil Mc Leod, Managing Director

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in Nov 1976 and is estimated to be completed in July 1977

Type of speech defect:

Severe cerebral palsy

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Manufacturer's name and address:

As above

Comments:

A series of electronic matrices arranged in various modes for easy selection through previously developed modular INPUT switches from 2 x 2 to 8 x 8 for use as communication aids with LED light and other displays typewriter, strip printer and cassette output.

Project No. 5

Title of project:

Spastic Centre of New South Wales Research Laboratory

Principal investigator:

Centre Industries
Allambie Road
Allambie Heights, 2100
N.S.W., Australia
Neil Mc Leod, Managing Director

Type of study:

Statistical and/or need analysis study
Development of instruments for training
Development of instruments for diagnosis
Development of technical aids for personal usage
The project started in 1974

Type of speech defect:

Severe cerebral palsied

Project result:

The project has resulted in a technical aid/instrument,

which is now being tested in rehabilitation work

Market introduction is planned for 1978/79
Depending on Field Tests

Manufacturer's name and address:

As above

Project description:

Two major projects in association with the University of New South Wales and Prince Henry and Prince of Wales Hospitals.

1. Investigation of ACTIONSTRETCH REFLEX control of abnormal muscle tone offers development of a new physical therapy based on Biofeedback Control of spinal reflexes. Trainer now utilises EMG and computer analysis will be used for Field Trials throughout 1977 when low cost Trainer Device will follow.
2. SPEECH. Intensive investigation and computer analysis compares statistical analysis of cerebral palsied speech phoneme with computer model of vocal tract and correlates these with simultaneous EMG recordings of seventeen speech muscle groups also analysed by computer.

Project No. 6

Title of project:

The Development of a Hearing Prosthesis

Principal investigators:

Professor G. M. Clark
Dr. D. J. Dewhurst
Departments of Otolaryngology and Electrical Engineering, University of Melbourne, Australia

Type of study:

Development of instruments for training
Development of technical aids for personal usage

The project started in 1971

Type of speech defect:

Severe sensorineural deafness

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is ongoing

Market introduction is planned

Patent is applied for

Documentation:

Clark, G M: A hearing prosthesis for severe perceptive deafness—Experimental studies. Reprinted from The Journal of Laryngology and Otology. Vol. LXXXVII (Oct. 1973), No 10, (pp 929–945).

Clark, G M et al: Histopathological findings in cochlear implants in cats. Reprinted from The Journal of Laryngology and Otology. Vol. LXXXIX (May 1975), No 5, (pp 495–504).

Clark, G M et al: A cochlear implant electrode. Reprinted from The Journal of Laryngology and Otology. Vol LXXXIX (Aug. 1975), No 8, (pp 787–792).

Clark, G M and Hallworth, R J: A multiple-electrode array for a cochlear implant. Reprinted from The Journal of Laryngology and Otology. Vol XC (July 1976), No 7, (pp 623–627).

Project No. 7**Title of project:**

No general project title

Principal investigators:

H. Haberfellner, MD
Univ.-Childrens Hospital
A-6020 Innsbruck
Austria

B. Rossiwall, MD, D. Dent.
Med.-Sch. Dept. Orthodontics
A-6020 Innsbruck
Austria

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project started in 1974 and is estimated to be completed in 1977

Type of speech defect:

Cerebral Palsy. Severe psychomotor retardation

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

No industrial production is planned or ongoing

Market introduction is not planned

Documentation:

Rossiwall, B, Haberfellner, H, Oberweger, H & Obendorf, W: Apparate zur Behandlung oraler Dysfunktion. Dental-labor, XXIV (1976). No. 5, (pp 673–674).

Haberfellner, H. & Rossiwall, B. Zur Behandlung des Spezialträufelns zerebral geschädigter Kinder. Münch, med. Wschr. 118 (1976) No. 27, (pp 879–882).

(Two English written papers are submitted for publication)

Project No. 8**Title of project:**

Etude des Dyscoordinations Pneumophoniques dans les Dysphonies Fonctionnelles

Principal investigator:

Phil. Dejonckere M. D.
E.S.P. V.C.L.
Centre d'Audio-Phonologie Paul Guns
Clos Chapelle aux Champs 3030
B 1200 Bruxelles, Belgium

Type of study:

Statistical and/or need analysis study

Development of instruments for diagnosis

The project started in 1975 and is estimated to be completed in 1977

Type of speech defect:

Functional dysphonia

Project result:

The project has not resulted in a technical aid/instrument

No industrial production is planned or ongoing

Market introduction is planned

Comments:

It concerns only instruments for diagnosis in phoniatrics

Project No. 9**Title of project:**

Essais d'Améliorations Techniques du Vibreur Harmoniques de Tarneaud

Principal investigator:

Phil. Dejonckere M. D.
E.S.P. V.C.L.

Centre d'Audio-Phonologie Paul Guns
Clos Chapelle aux Champs 3030
B 1200 Bruxelles, Belgium

Type of study:

Development of instruments for training

The project is planned to start in 1977

Type of speech defect:
Dysphonie fonctionnelle

Project result:
The project has not resulted in a technical aid/instrument

Project description:
Améliorer la qualité et la rapidité de rééducations logopédiques des dysphonies fonctionnelles de l'adulte, tant hypo- qu'hyperkinétiques

Project No. 10

Title of project:
Blissymbolics Communication Evaluation Study

Principal investigators:
Mrs Shirley McNaughton
Mrs Barbara Kates
Blissymbolics Communication Foundation
862 Eglinton Ave. W.
Toronto, Ont.

Dr Harry Silverman
Ontario Ministry of Education
252 Bloor St. E.
Toronto, Ont. Canada

Type of study:
Statistical and/or need analysis study
Evaluation study
The project was completed in 1976

Type of speech defect:
Resulting from cerebral palsy, where oral musculature involved, prohibiting functional speech

Comments:
We will have a Handbook available soon where you will find further details of the study, with photographs etc. Please keep in touch for further information regarding its availability.

Market introduction is planned for 77-78.

Project description:
To tentatively explore the use of Blissymbols as used by a population previously ascertained. The population was mainly composed of cerebral-palsied children from 3 years of age to 20 who lacked functional speech and were motorically impaired. Hoped to establish through this exploration and evaluation, a consistent and stable system which could be presented to instructors (and other interested parties) through suggested guidelines. Again, I would refer you to the Handbook.

Project No. 11

Title of project:
Instant Spectrographic Feedback in Speech Training for Children with Severe Hearing Impairment

Principal investigator:
Seppo K. Tuomi, Ph.D.
Program in Communicative Disorders
University of Western Ontario, LONDON,
Ontario N6A 5C2 Canada

Type of study:
Development of instruments for training
The project is planned to start in 1977

Type of speech defect:
Severe articulation problem secondary to severe hearing impairment

Project result:
The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:
Kay Elemetrics Corporation, 12 Maple Avenue,
Pine Brook, New Jersey, U.S.A. 07058

Comments:
Available from manufacturer

Project description:
Currently severely hearing impaired children have a great deal of trouble developing intelligible speech. In their attempt to pronounce specific sounds they pattern their production on the phoneme that they perceive, distorted by their hearing problem. Their articulation is consequently distorted.

A treatment program initially designed to replace (or supplement) their distorted auditory feedback with visual feedback that is intact and capable of supporting articulatory acquisition is theoretically viable. The program is also designed to help the severely hearing impaired child to rely upon his proprioceptive system for articulatory accuracy after using vision during the learning process.

The method includes:
Step one—pairing visual feedback of the acoustic event with study of proprioceptive constituents.

Step two—gradual fading of visual feedback until articulatory accuracy is achieved based on proprioception alone.

Step three—the achieved articulatory accuracy is transferred into the child's normal environment (educational and social) and maintained.

NOTE: periodic evaluation is scheduled to monitor for changes in the acquired speech skill.

The above treatment program will be tested in a controlled study to evaluate its potential value. Research will begin in 1977 and should be completed in one year.

Project No. 12

Title of project:

Letter Synthesizer

Principal investigator:

Georg Bruun, S. Duus Hansen,
Electronics Laboratory, Bldg 344,
Technical University of Denmark
2800 Lyngby, Denmark

Comments:

An electronic letter synthesizer is being developed. Completion expected late 1976.

The synthesizer is primarily intended as an aid for blind people. The problems concerning the synthesizer as an aid for people with speech defects will possibly be taken up in a later project.

Project No. 13

Title of project:

The Vidialog System

Principal investigator:

Electronics Laboratory, Building 344
Technical University of Denmark
2800 Lyngby, Denmark

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

ELMI A/S, Kirkebjerg Alle, DK 2600 Glostrup

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project was completed in 1975

Comments:

All sales rights for the vidialog system have been handed over to:

Messrs. A. Johnson & Co A/S
42, Holmens Kanal
DK 1060 Copenhagen K

Type of speech defect:

All sorts of speech defects. The system is primarily for motor handicapped persons

Documentation:

Leaflet on The Vidialog System. Electronic Measuring Instruments, 90, Kirkebjerg Alle, DK 2600 Glostrup, Denmark

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Project No. 14

Title of project:

Teledialog

Principal investigator:

ELMI A/S
90, Kirkebjerg Alle
DK 2600 Glostrup
Denmark

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is planned

The equipment is introduced on the market

Manufacturer's name and address:

ELMI A/S, 90 Kirkebjerg Alle, DK 2600 Glostrup

Type of study:

Development of technical aids for personal usage
The project started in April 1974 and is estimated to be completed in November 1976

Documentation:

Leaflet on the Teledialog, Type MT 1. Electronic Measuring Instruments, 90, Kirkebjerg Alle, DK 2600 Glostrup, Denmark

Type of speech defect:

All sorts of speech defects

Project No. 15

Title of project:

Development of Visual Display for Training Speech Prosody.

Principal investigator:

F-J Electronics A/S
Vestre Paradisvej 46
2840 Holte, Denmark

Type of study:

Development of instruments for training

The project started in 1974 and was completed in year 1976

Project result:

The project has resulted in a technical aid/instrument.

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

F-J Electronics A/S, Vestre Paradisvej 46, 2840 Holte, Denmark

Comments:

Data sheets available "Curve Display type DC 1300".

Project No. 16

Title of project:

Development of Visual Display for Training Intonation

Principal investigator:

F-J Electronics A/S,
Vestre Paradisvej 46,
DK-2840 Holte, Denmark

in cooperation with Philippe Martin,
Toronto University, Canada

Type of study:

Statistical and/or need analysis study

Development of instruments for training

The project started in 1972 and was completed in 1976

Project result:

The project has resulted in a technical aid/instrument, which is shortly planned to be tested in rehabilitation work

Industrial production is planned

The equipment is introduced on the market

Manufacturer's name and address:

F-J Electronics A/S, Vestre Paradisvej 46, 2840 Holte, Denmark

Documentation:

Datasheets available "Pitch Computer"

Project No. 17

Title of project:

Quantitative Electromyographic Evaluation of Stuttering Severity

Principal investigator:

Steen Fibiger, Department of Electromyography,
The Royal Dental College, Copenhagen and
Department of Neurophysiology, University of Copenhagen

Mailing address:
Audiologopedic Research Group
University of Copenhagen
86 Njalsgade
DK-2300 Copenhagen S, Denmark

Type of study:

Statistical and/or need analysis study

Development of instruments for diagnosis

The project started in 1973 and is estimated to be completed in 1976

Type of speech defect:

Stuttering

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production planned or ongoing

Market introduction is not planned

Project description:

Quantitative Electromyographic Evaluation of Stuttering Severity

A new bipolar wire electrode for electromyographic kinesiography of the perioral muscles has been constructed. The electrode (1) do not disturb the speech production, (2) do only record from the wanted muscle, (3) is adjustable, (4) do not move in the muscle during speech, and (5) has constant inter-lead distance and leading-off areas. The electromyographic recordings include the opening and closing muscles of the lips.

Muscle activity in connection with labial explosion.

The measurement of muscle activity is performed on the burst of activity in the right opening muscle (m. depressor labii inferior) just ahead of /b/ and /p/. The course of muscle activity is described by the maximum level of muscle activity in connection with the stop consonant and the length of the period where the level of activity is more than 50 % of the maximum level. Until now the measurements have been made on /b/ and /p/ in initial position during reading and spontaneous speech. The preliminary results show that the length of activity and the maximum level of activity in the group of stuttering persons were double that of the values found in the group of non-stuttering subjects. The variance of the mean values of both the length and maximum activity was significantly higher in the stuttering subjects. Non-stuttering subjects exposed to 180 milliseconds delayed auditory feedback showed a longer burst of activity and an increased variance. Stuttering persons exposed to delayed auditory feedback or audible muscle activity feedback (biofeedback) showed a shorter burst of activity and a decreased variance.

Perioral muscle activity during speech blocks.

The sum of the lengths of muscle activity in the perioral

muscles in connection with speech blocks was divided with the number of syllables in the speech sequence. The preliminary results show to some extent a proportionality between (1) the mean "block activity" per syllable, (2) the length of activity in the depressor muscle and (3) the variance of the length in connection with /b/ and /p/ explosions.

A graduated subjective evaluation of the stuttering severity performed by a speech therapist shows to some extent a proportionality to the electromyographic parameters of stuttering severity.

Documentation:

Fibiger, S: A Bipolar Electrode for Electromyographic Kinesiology of the Muscles of the Lips During Speech. Proc. III Nordic Meeting on Medical and Biological Engineering. Tampere 15-18/1 1975:54: 1-2

Fibiger, S: Kvantitativ elektromyografisk vurdering af stammen. Nordisk Samarbejdsråd for Logopedi og Foniatri's 2. nordiske seminar 13-15/8 1976 (Published in Logos No. 7 p. 24, Audiologopedic Research Group, August 1976, and Plus (Stockholm) 3/1976.

Project No. 18

Title of project:

Development of Instrumentation for Evaluation of Voice Quality.

Principal investigators:

B. Frøkjær-Jensen, Audiologopedic Research Group, University of Copenhagen, Njalsgade 86, DK-2300 Copenhagen S, Denmark

Sveed Prytz, M. D., Same address

Type of study:

Statistical and/or need analysis study

Development of instruments for diagnosis

The project started in 1973 and is estimated to be completed in 1977

Type of speech defect:

Voice disorders

Project result:

The project has not resulted in a technical aid/instrument

Comments:

The parameters used for this work were presented and discussed in a sectionpaper at the 8. international congress of phonetic sciences in Leeds, 1975.

Project description:

For comparisons of voice qualities we have tried to set up a parameter which is a measure of the intensity relations in the higher and the lower parts of the speech spectrum:

$$a = \frac{\text{INTENSITY ABOVE 1000 Hz}}{\text{INTENSITY BELOW 1000 Hz}}$$

Because the spectrum above 1000 Hz is normalized relative to the spectrum below 1000 Hz, "a" is independent of microphone distance, amplification level, etc.

Preliminary research seems to indicate that "a" is a relevant parameter for evaluations and comparisons of voice qualities. The parameter is represented graphically by histograms showing the number of "a"-values automatically sampled during a read text.

It may also be displayed on a storage oscilloscope along the vertical axis. The horizontal axis is used for displaying the total speech intensity.

Documentation:

Frøkjær-Jensen, B & Prytz, S: Registration of Voice Quality. Aripuc (1975) No 9, (pp 237-251). Paper read at the International Congress of Phonetic Sciences in Leeds, August 1975.

Project No. 19

Title of project:

Development of Communication Aids for the Sensory Handicapped

Principal investigator:

Matti Karjalainen, Technical Research Centre of Finland
Biomedical Engineering Laboratory
PI 527
33101 Tampere 10
SF-Finland

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project started on January 1, 1974 and is estimated to be completed on June 30, 1978

Type of speech defect:

Mute

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

The aim is to develop an inexpensive portable speech

synthesizer, which can be used in different information and communication aids for the blind, the mute and other communication handicapped. The main aid is the development of the speech synthesizer and its application to a "speaking machine" for the speech disabled.

A preliminary study of text recognition and possibilities to realize a reading machine for the blind is another part of the project.

The third aim is to carry out a preliminary study on speech recognition and its applications to the aids of the handicapped.

Methods: The basic principles for the development work is to use microcomputers and advanced analog signal processing. This is necessary, if an inexpensive device is to be developed.

Main results (March 15, 1977): The first text-to-speech synthesizer prototype was completed in June 1976. The second, improved portable version is under work and it will be completed during 1977 ("the speaking machine"). The first experiments with a text recognition system consisting of a TV-camera and a minicomputer are under work.

Documentation:

Karjalainen, M Laine, U: Development of communication aids for the handicapped based on speech synthesis techniques. 11th International Conference on Medical and Biological Engineering, Ottawa August 02...06, 1976.

Project No. 20

Title of project:

Project SIRENE

Principal investigator:

Jean-Paul Haton, Professor
Computer Science Laboratory
University of Nancy 1
F-54037 - Nancy Cedex, France

Type of study:

Development of instruments for training

The project started in 1974

Type of speech defect:

Speech training for deaf and hard of hearing children

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

- development of signal processing and analysis techniques toward the automatic diagnosis of speech disorders and the test of quality of pathological voices

- utilization of visual displays for computer-assisted training of deaf children:

pitch, rhythm and intensity control,
vowel and consonant uttering

- test of the usefulness of automatic speech recognition techniques in speech training.

Documentation:

Haton, J-P et al: SIRENE; Un projet de systeme interactif pour la rééducation vocale des enfants non-entendants. 6èmes Journées d'étude sur la Parole. Toulouse 28 au 30 Mai 1975, (pp 300-311).

Haton, M-C & Haton, J-P: Essai de caractérisation des voix d'enfants sourds par analyse polynomiale de la mélodie. 6èmes Journées d'étude sur la Parole. Toulouse 28 au 30 Mai 1975, (pp 318-325).

Title of project:

Elektrokutane Sprachvermittlung

Principal investigator:

Dr Breiner, Herbert
Augustin-Violet-Schule f. hörgeschädigte Kinder
671 Frankenthal – Holzhofstr. 21
West Germany (BRD)

Type of study:

Statistical and/or need analysis study
Development of technical aids for personal usage
The project was completed in 1972

Type of speech defect:

Taubstumm (deaf)

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work
No industrial production is planned or ongoing
Market introduction is not planned

Project description:

Human skin is not a simple object for research. Its anatomical structure, the possible forms and procedures of stimulation involve rather complex problems. When skin is stimulated by mechanical (adequate) or electrical (inadequate) vibration it appears that there are properties which are similar to those of the ear. This fact leads to

the question how far cutaneous speech transmission may be possible.

When treating this problem it is necessary to collect the results of corresponding investigations and to make a survey of them. For that purpose the physiological data of skin in respect to mechanical and electrical stimulation are collected and plotted together.

In order to facilitate further investigation the techniques of mechanical and electrical stimulation of skin as well as the transmitting properties of skin are described, especially with regard to the presentation of the stimuli by vibrators respectively by electrodes.

The numerous experiments to transmit language cutaneously in some way or other are classified and described. The tactile perception of language is described as well as the Gestalt qualities, different degrees of distinctness, masking effects, local patterns and apparent movements. Time of exposition and spatial relations turn out to be significant for the existence of diacritical traits.

It is difficult to compare the results of cutaneous communication. The identificability of sounds, syllables, words and sentences by means of the various procedures of speech transmission are discussed. The author proposes to define the results as the percentage of the offered information $H(y)$ that has been transmitted, in form $T(x; y)$.

Documentation:

Breiner, H: Hautsinn und lautsprachliche Kommunikation, Neckar-Verlag Villingen, 1972

Project No. 22**Title of project:**

Writing Telephone for Deaf

Principal investigator:

Deutsche Gesellschaft zur Förderung der Hör-, Sprach-Geschädigten, Referat technische Hilfen für Hörgeschädigte
Heinrich-von-Kleist-Strasse 15
4400 Münster-Nienberge
Germany (West)

Type of study:

Development of technical aids for personal usage
The project started in May 1976 and is estimated to be completed in 1978

Type of speech defect:

Deaf

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Manufacturer's name and address:

Investigator himself

Comments:

Writing telephones for the deaf are well known and just in use in some countries. We solve the special problems of organisation in Germany.

Project description:

The aim of the project is to build up a telecommunication system for the deaf in Germany. Although there are very good writing telephones on the market, we develop a new type, because we demand compatibility to new data-display-systems like Ceefax and Viewdata.

Beside the technical equipment we plan to offer an information service by telephone for the deaf.

Project No. 23

Title of project:

Closed Captions on Video Films for the Deaf

Principal investigator:

Deutsche Gesellschaft zur Förderung der Hör-, Sprach-
Geschädigten, Referat technische Hilfen für Hörgeschä-
digte

Heinrich-von-Kleist-Strasse 15

4400 Münster-Nienberge

Germany (West)

Type of study:

Development of technical aids for personal usage

The project started in May 1976

Type of speech defect:

Deaf

Project result:

The project has resulted in a technical aid/instrument,
which is now being tested in rehabilitation work

Industrial production is planned

Comments:

Closed captioning is a well known technique and in some
countries in the experimental stage. It can be used for
wireless television programs as well as for films stored on
magnetic tape. We are solving problems of organisation
in Germany.

Project No. 24

Title of project:

Frequency Transposition of Speech

Principal investigator:

PD. Dr. P. Finkenzeller

Institut für Physiologie und Biokybernetik

Universitätsstr. 17

D-8520 Erlangen, West Germany (BRD)

Type of study:

Statistical and/or need analysis study

Development of technical aids for personal usage

The project started in 1973 and is estimated to be com-
pleted in 1978

Type of speech defect:

Deafness

Project result:

The project has resulted in a technical aid/instrument,
which is now being tested in rehabilitation work

Industrial production is planned

Project description:

For some reasons, the low frequency band between 50
and 400 Hz is of special interest for artificial auditory sti-
mulation in the deaf: possibly existing low frequency
hearing rests, frequency sensitivity of the skin for vibro-
tactile stimulation, and the one-to-one coding by electri-
cal nerve stimulation. Previous attempts to transpose
speech into this frequency band, mainly using rotating
magnetic tape heads (OEKEN, 1967) did not yield en-
couraging intelligibility. Based on MILLER and LICK-
LIDER's experiments with interrupted speech and an
additional time extension of the remaining segments
(KUSCH, 1971), a new approach has become feasible by
enlarging speech segments of several milliseconds dura-
tion while cancelling others. Sonagrams of the on-line
working device show a well preserved speech structure.
First tests with deaf patients correspond to the expecta-
tions.

Project No. 25

Title of project:

Artificial Electric Stimulation of the Ear

Principal investigator:

Professor Dr. W. D. Keidel

Institut für Physiologie und Biokybernetik

Universitätsstr. 17

D-8520 Erlangen, West Germany (BRD)

Type of study:

Statistical and/or need analysis study

Development of instruments for diagnosis

Development of technical aids for personal usage

The project is planned to start in 1977

Project result:

The project has resulted in a technical aid/instrument,
which shortly is planned to be tested in rehabilitation
work

No industrial production is planned or ongoing

Market introduction is not planned

Comments:

Part of a project of the ad hoc Working Group on Deaf-
ness of the European Communities
Chairman: Prof. W. D. Keidel

Project description:

The ultimate aim of artificial auditory stimulation is the
provision of adequate speech intelligibility to the totally

deaf. More practical goals which could be realised in the short to medium term and which can give information useful in other areas are detailed below:

Exchange of collected information among European countries on artificial auditory stimulation (A.A.S.)

Evaluation of the information that can be given from known surgically safe procedures.

Studies on speech material: Encoding and decoding of essential speech information, evaluation of comparative risks of different surgical approaches.

Patient evaluation and selection.

Animal experimentation in basic physiological principles for encoding and decoding of auditory signals, in relation to human speech recognition.

Comparison of information available from processed signals in different modalities. (Vibrotactile, visual, etc.).

Formulation of mathematical models for peripheral and central physiological information processing, electrode performance, and information extraction from speech.

Studies of electronic processing and coding of the signal for the electrode. (Simulation and realisation).

Project No. 26

Title of project:

"Speech-Stimulation and Speech-Control by Baby-Fonators" – Development of Speech for Deaf and Hard of Hearing Impaired Children

Principal investigator:

Research Center for Applied Linguistics for the Rehabilitation of the Disabled
Pädagogische Hochschule, 69 Heidelberg
Im Neuenheimer Feld 561
FRG Forschungsstelle F. Angewandte Sprachwissenschaft Z. Rehabilitation Behinderter
Dir.: Prof. Dr. K. Schulte
Telefon: 0621/56 4228

Type of study:

Statistical and/or need analysis study
Development of instruments for training

Development of technical aids for personal usage

The project is planned to start in 1977 and is estimated to be completed in 1984

Type of speech defect:

Deaf and hard of hearing impaired

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Documentation:

Research Project "*Speech-Stimulation and Speech-Control by Baby-Fonators*" – Development of Speech for Deaf and Hard of Hearing Impaired Children (paper)

Project No. 27

Title of project:

Phonemetransmitting Manual System

Principal investigator:

Research Center for Applied Linguistics for the Rehabilitation of the Disabled
Pädagogische Hochschule, 69 Heidelberg
Im Neuenheimer Feld 561
FRG Forschungsstelle F. Angewandte Sprachwissenschaft Z. Rehabilitation Behinderter
Dir.: Prof. Dr. K. Schulte
Telefon: 0621/56 4228

Type of study:

Statistical and/or need analysis study

Development of Communication-systems

The project was completed in 1973

Type of speech defect:

Deaf and hard of hearing impaired

Project result:

The project has resulted in a communication system which is in regular use

Documentation:

Schulte, K et al: 10 Years Research, 1966–1967. Research Center for Applied Linguistics for the Rehabilitation of the Disabled, Heidelberg. 1976, Chapter 1.3 (pp 32–40).

Project No. 28

Title of project:

Fonator-System

Principal investigator:

Research Center for Applied Linguistics for the Rehabilitation of the Disabled
Pädagogische Hochschule, 69 Heidelberg
Im Neuenheimer Feld 561
FRG Forschungsstelle F. Angewandte Sprachwissenschaft Z. Rehabilitation Behinderter
Dir.: Prof. Dr. K. Schulte
Telefon: 0621/56 4228

Type of study:

Statistical and/or need analysis study
Development of instruments for training
Development of technical aids for personal usage

The project was completed in 1969

Type of speech defect:

Deaf and hard of hearing impaired

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

Manufacturer's name and address:

Siemens Corporation, Erlangen FRG

Documentation:

Schulte, K et al: 10 Years Research, 1966-1967. Research Center for Applied Linguistics for the Rehabilitation of the Disabled, Heidelberg. 1976, Chapter 1.2, (pp 23-31).

Project No. 29

Title of project:

Experimental Comparison Between Three Oscilloscope Phonemes Visualizing Systems (PVS)

Principal investigator:

Research Center for Applied Linguistics for the Rehabilitation of the Disabled
Pädagogische Hochschule, 69 Heidelberg
Im Neuenheimer Feld 561
FRG Forschungsstelle F. Angewandte Sprachwissenschaft Z. Rehabilitation Behinderter
Dir.: Prof. Dr. K. Schulte
Telefon: 0621/56 4228

Type of study:

Statistical and/or need analysis study
The project was completed in 1969

Type of speech defect:

Deaf and hard of hearing impaired

Project result:

The project has not resulted in a technical aid/instrument

Documentation:

Schulte, K et al: 10 Years Research, 1966-1976. Research Center for Applied Linguistics for the Rehabilitation of the Disabled, Heidelberg. 1976, Chapter 1.1 (pp 16-22).

Project No. 30

Title of project:

Technical Aid after Totalexstirpation Laryngis
The project started in 1961

Principal investigator:

Dr. Tibor Frint
Postgraduate Medical School
Bp 1389, Szabolcs u. 35 Hungary

Type of speech defect:

After totalexstirpation laryngis

Project result:

In the project we are using technical aids which already have been introduced on the market and are regularly used in rehabilitation work

Patent No.

AG-61 (USSR)
Servox (BDR)

Comments:

In generally our patients are taught to natural oesophageal speech, in severe cases we use an artificial larynx made in the USSR. These patients can't learn oesophageal speech.

Project No. 31

Title of project:

Artificial Tongue for Glossectomees

Principal investigator:

Dr. P. V. S. Rao
Tata Institute of Fundamental Research
Homi Ehabha Road, Colaba, Bombay 400 005, India

Type of study:

Development of technical aids for personal usage

The project started in 1974 and is estimated to be completed in 1976

Type of speech defect:

Loss of speech in total glossectomy

Project result:

The project has resulted in a technical aid/instrument,

which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

Problem: To provide intelligible speech capability to patients of total glossectomy

Method: An inflatable latex (edible grade) tongue is made in two or more parts which can be externally manipulated using pneumatic controls

Results: Two parts of the tongue have been tested and they individually produce dental and velar sounds

Aim: To realise an artificial tongue intended for producing intelligible speech

Project No. 32

Title of project:

The Development of Very Early Communication in Severely Subnormal Children

Principal investigator:

Dr. Sinclair Rogers,
School of Behavioural Sciences
Ulster Polytechnic,
Jordanstown,
Co. Antrim BT37 0QB, N. Ireland

Type of study:

Development of instruments for training

The project started in 1975 and is estimated to be completed in 1977

Type of speech defect:

Secondary speech defects caused by mental subnormality.
The children have no language as yet

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

Some severely subnormal children who were non-communicators at the start of the project have been intensively observed since September 1974. Their communicative behaviour has been recorded by means of photographs and by video taping. A series of analyses have been undertaken.

A series of secondary stimuli were presented to the children in the form of photographs of the children's mother and father. Some of the children were able, after some time, to respond and eventually 'call for' these secondary stimuli. Thus the children had begun to use a verbal system of communication.

Documentation:

Paper read at 3rd International Symposium on Child Language, London, September 1975:

Sinclair Rogers: *Very early communication in SSN Children*

Project No. 33

Title of project:

The Development of Communication in Severely Subnormal Children

Principal investigator:

Dr. Sinclair Rogers
Ulster Polytechnic
Jordanstown, N. Ireland

Type of study:

Development of instruments for training

The project started in 1973 and is estimated to be completed in 1978

Type of speech defect:

Those associated with Severe Mental Subnormality

Project result:

The project has not resulted in a technical aid/instrument

Project description:

Producing a development programme based on linguistic, psychological criteria.

Documentation:

Rogers, S: Very Early Communication in Severely Sub-normal Children. School of Behavioural Sciences. The Northern Ireland Polytechnic, Jordanstown Newtownabbey Co. Antrim BT37 OQB, Ireland

Project No. 34**Title of project:**

Voice Therapy

Principal investigator:

Joel Frank M. A.
Tel Aviv University (Fac. of Med.)
School for Communication Disorders
Sheba Medical Center, Tel Hashomer, Israel

Type of study:

Statistical and/or need analysis study
Development of instruments for diagnosis
The project started in April 1976 and a new project is planned to start 1977/78

Type of speech defect:

Voice Disorders

Project description:

In our clinic we use a Voice Graph 700 (Spectrograph) for diagnosis, evaluation of progress of therapy, decision about finishing the therapy and for research.

We found that the Spectrograph provides the means of portraying in a more objective way the state of voice in speech. This is useful as a feedback for patients and therapist alike in voice rehabilitation.

The usage is in the following Pathologies:

Corpectomy
Total Laryngectomy
Functional/Professional Disorder of Voice
Vocal Nodules
Rhinolalias
and also for deaf and hard of hearing persons in order to change "deaf voice".

The phoniater of our clinic daily uses a Stroboscope in order to examine the manner of vibration of the vocal cords.

Project No. 35**Title of project:**

Detailed Operating Instructions for the Correct Use of the Instruments for Training Italian People with Speech Defects

Principal investigator:

Dr. Franco Ferrero
Centro di Studio per le Ricerche di Fonetica del C.N.R.
Via G. Oberdan 10
35100 Padova (Italy)

Type of study:

Development of instruments for training
The project is planned to start in 1977

Type of speech defect:

All speech defects for which instruments for training are available

Project No. 36**Title of project:**

Objective Methods for Diagnosis of Voice Disorders

Principal investigator:

Dr. Franco Ferrero
Centro di Studio per le Ricerche di Fonetica del C.N.R.
Via G. Oberdan 10
35100 Padova (Italy)

Type of study:

Statistical and/or need analysis study
The project started on 1/1/1976 and is estimated to be completed on 31/12/1978

Type of speech defect:

Pathologic Laryngeal Functions

Project result:

The project has not resulted in a technical aid/instrument

Project description:

Problem: Objective statistical analysis of some laryngeal defects

Method: Acoustical analysis; photoelectric and electric glottography; computer statistical analysis

Aim: To find some glottographic wave-form and/or acoustic parameter characteristic of each dysphonia

Main results: Collection of data in progress

Title of project:

Experimental Study of Articulatory Defects

Principal investigator:

Prof. Lucio Croatto
Centro Medico Chirurgico di Foniatria e Rieducazione
Acustica
Via Bergamo 10
35100 Padova (Italy)

Type of study:

Statistical and/or need analysis study
Development of instruments for training
The project is planned to start in 1977

Type of speech defect:

Cleft Plate, Palatoschisis, Nasalisation (rhinophony, rhinolalia), recurrent paralysis

Project description:

Problem: Detailed acoustical classification of some articulatory defects

Method: Standard acoustical analysis and computer non-standard analysis

Aim: To find the main acoustic correlates of some pathological articulations and to develop instruments for training.

Project No. 38**Title of project:**

Metroword

Principal investigator:

Firm: "SAMA" di F. & R. Sandri
Via Saluzzo 98
10126 Torino (Italy)

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in 1975 and is estimated to be completed at the end of 1976

Type of speech defect:

Stammering

Project result:

The project has resulted in a technical aid/instrument,

which shortly is planned to be tested in rehabilitation work

Industrial production is planned

Market introduction is not planned

Manufacturer's name and address:

"SAMA" di F. & R. Sandri
Via Saluzzo 98, 10126 Torino (Italy)

Project description:

The Metroword is an electronic metronome, which aids the stammerers to speak correctly. It works with an electronic circuit located in a pocket box. It puts into service an earphone which emits an intermittent signal. This signal is variable by a frequency control from 80 to 120 tickings per minute and aids the stammerers inducing them to syllable words in accordance with the metronome's thickenings. The earphone is placed in the ear with the proper earhanger.

Project No. 39**Title of project:**

Artificial Larynx

Principal investigator:

Firm: "SAMA" di F. & R. Sandri
Via Saluzzo 98
10126 Torino (Italy)

Type of study:

Development of technical aids for personal usage
The project was completed in 1965 (Afterwards we have proceeded in several improvements)

Type of speech defect:

Total lack of the voice (laryngectomized patients)

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

The equipment is introduced on the market

Manufacturer's name and address:

"SAMA" di F. & R. Sandri
Via Saluzzo 98, 10126 Torino (Italy)

Patent No.

148737/684674/801648

Comments:

Patent numbers refer to the different models of Artificial Larynx we manufacture

Comments:

We manufacture four models of Artificial Larynges:

Electronvox
Mini-Electronvox
Phonatron
Vibrovox

Besides, we manufacture a transistorized voice amplifier, for people with low voice: Emitron

Documentation:

Leaflet on Artificial Larynges for Laryngotomy patients, Transistorized Voice Amplifiers. "SAMA", di F. & R. Sandri, Via Saluzzo 98, 10126 Torino, Italy

Technical Information about Artificial Larynges (paper)

Project No. 40**Title of project:**

Researches in Speech Training Aid for Hard of Hearing Children

Principal investigator:

Akira Watanabe,
 Faculty of Engineering, Kumamoto University,
 Kurokami 2-chome, 860 Kumamoto, Japan

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project started in 1970 and is estimated to be completed in 1980

Type of speech defect:

Hard of hearing and deaf

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

In our investigation, the aim is to develop speech training aids by use of visual display for hard of hearing children.

As the result of reconsideration about the reason why speech training aids didn't spread so far, we attached importance to the following points to design new training aids from the point of view of engineer.

(1) To apply speech processing technique in high accuracy to the device without complicating it.

(2) To use such the display that hard of hearing children can understand intuitively the relation between aspect of visual display and somatic feedback at utterance.

(3) Easy operation of the device.

The three kinds of speech training aid developed by our project are what use 11" CRT as the display device, and those have the following strong points respectively.

(a) 2 dimensional pitch-intensity indicator:

In this indicator, the pitch signal is extracted by an improved "Gruenz type" pitch detector in which the time constant of integration is varied automatically to fit the input speech signal. The improvement allows the pitch signal to be extracted in the range from 80 Hz to 600 Hz without manual operation. This indicator is used to master the way of pitch control.

(b) Articulatory trainer of vowels by use of inverse filters:

This trainer is what extracts the first and second formants from the speech and displays those as a brightening spot in the F1-F2 diagram on the CRT screen. The two formants are extracted as mean zero crossing frequencies from each output of two inverse filters, which are controlled mutually by the approximate values of formants.

(c) Speech trainer for correction of intonation:

In this trainer, the pitch pattern of a short sentence uttered by a teacher is memorized and displayed as a rested reference pattern in the position adapted to the childish voice on the CRT screen. Hard of hearing child tries to fit his pitch pattern in the reference pattern and can understand the intonation.

The training effects were evaluated by means of numerical analysis and hearing test of utterances of hard of hearing children. The results showed the remarkable effects. Those trainers are usually used in Amakusa school for the deaf.

Documentation:

1) A. Watanabe and H. Okamura, "Effect of Speech Training by 2 Dimensional Pitch-Intensity Indicator on Deaf Children," J. Acoust. Soc. Japan, Vol. 31, No. 3, 1975.

2) A. Watanabe and S. Kisu, "Articulatory Trainer for Vowels by Inverse Filter," Tech. Group Speech, Acous. Soc. Japan, Paper S74-51, 1975.

3) A. Watanabe and H. Okamura, "Speech Trainer for Intonation and Its Effect," Tech. Group Speech, Acous. Soc. Japan, Paper s75-54, 1976.

4) S. Kisu, A. Watanabe and H. Okamura, "Correction of Vowel Articulation by Use of Articulatory Trainer," Tech. Group Speech, Acous. Soc. Japan, Paper s75-53, 1976.

Title of project:

Palato-Graphy-Assisted Speech Training System for Speech and Hearing Disorders

Principal investigator:

Sadao Shibata, M. D.
The National Center of Speech and Hearing Disorders
No. 1, Toyama-cho, Shinjuku-ku, Tokyo, Japan (Postal Code 162)

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project started in 1973 and is estimated to be completed in 1978

Type of speech defect:

Articulation Disorders caused by Hard of Hearing, Cleft Palate, Cerebral Palsy.

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is planned

Patent No.

20

Comments:

The documents are not written in English

Project No. 42

Title of project:

Voice-Operated Toys for Young Hearing-Impaired Children

Principal investigator:

Hideo Imai
The National Institute of Special Education
2360, Nobi, Yokosuka, Kanagawa Pref. 239
Japan

Type of study:

Development of instruments for training

The project started on April 1, 1975 and is estimated to be completed on March 31, 1977

Type of speech defect:

Hearing impairment

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

DANA JAPAN Co. Ltd.
Taio-Shoken Bldg.
16/5 Taito 3-Chome, Taito-ku, Tokyo 110, Japan

Project description:

Aim: For young children with hearing impairment to build up a natural voice with good control of pitch and intensity.

The Composition of the Instrument:

- (1) An FM microphone for a child mounted on a helmet.
- (2) The Analyzer which extracts the frequency and intensity of the child's voice transmitted on the FM wave.

Pitch extracted is between 100 to 400 Hz, the intensity is between 60 to 110 dB (SPL), and the duration is from 0.1 to 9.9 seconds. Any range within each of the above values can be preset as a criterion for the child to perform in the exercise. When the pitch, intensity and/or duration of the child's voice falls within the preset criterion, the Analyzer emits a radio frequency wave controlling the movement of a toy.

- (3) The Toy operates as a reward for the successfulness of the child's exercise to speak with a good control of pitch and intensity. The toy—a tank—moves with variable speed both forward and backward, turns to the left or to the right; the gun-barrel moves up and down; and has a flashing-lamp. All of these functions are controlled by radio frequency signals from the Analyzer.

We think a special characteristic of this instrument is the link between Analyzer and Toy. As the toy is so-to-speak "soft-ware," any radio-controlled toy can be utilized and any function of the Analyzer can be added to control the toy.

The instrument is presently being developed, and from this June a trial will be performed.

Project No. 43

Title of project:

Dynamic Palatography

Principal investigator:

Masayuki Sawashima
Research Institute of Logopedics and Phoniatrics,
University of Tokyo
Hongo, Tokyo, Japan

Type of study:

Development of instruments for training
Development of instruments for diagnosis
Development of technical aids for personal usage
The project started in 1973

Type of speech defect:

- 1) Deaf
- 2) Other articulatory disorders

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work
No industrial production is planned or ongoing
Market introduction is not planned

Project description:

The aim of the project is to provide an accurate method for monitoring the tongue-palate contact during speech. At present, the system is computer-controlled and the contact pattern is displayed on a monitor screen either on real time or on expanded time scale. The preparation of an artificial palate for each individual is the consuming and, therefore, simplification is now being considered. For personal usage, hard ware control system can also be developed to replace the present computer system.

Project No. 44

Title of project:

Use of Flexible Fiberscope for Monitoring Articulatory Movements

Principal investigator:

Masayuki Sawashima
Research Institute of Logopedics and Phoniatrics,
University of Tokyo
Hongo, Tokyo, Japan

Type of study:

Development of instruments for training
Development of instruments for diagnosis
Development of technical aids for personal usage
The project started in 1972

Type of speech defect:

- 1) Deaf
- 2) Other articulatory disorders

- 3) Voice disorders, particularly psychogenic dysphonia

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work
The equipment is introduced on the market

Manufacturer's name and address:

Olympus Company, Tokyo, Japan

Project description:

The principal aim of the project is to develop a specific type of thin flexible fiberscope which can easily be introduced through the nose to observe the movements of the vocal folds or the velum without interfering with natural speech activity. At present, several types are available with regards to different view angle and/or diameter. Photography (still and cine) and video-taping are possible and the subject can monitor his own articulatory movements on TV screen.

Project No. 45

Title of project:

Speech Machine (an answering tool for articulation deficiency)

Principal investigator:

Masaya Hoshino
Tokyo Metropolitan Rehabilitation Center for Physically and Mentally Handicapped
43 Toyama-cho, Shinjuku-ku, Tokyo, Japan

Type of study:

Development of technical aids for personal usage

The project started in 1972

Type of speech defect:

Articulation deficiency

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work
No industrial production is planned or ongoing

Manufacturer's name and address:

Teac Audio Systems Corporation, 3-7-3 Nakamachi,
Musashino-shi, Tokyo, Japan

Documentation:

Hoshino, M: Introduction of a New Device: Speech

Machine—an answering tool for articulation deficiency—
Paper on a device developed by the Tokyo Metropolitan
Rehabilitation Center for the Physically and Mentally
Handicapped in collaboration with Teac Audio System
Corporation.

Project No. 46**Title of project:**

Hoseiki (Voice Recognition Aid)

Principal investigator:

Eiichi Ishitoya
Tokyo Metropolitan Rehabilitation Center for the Physi-
cally and Mentally Handicapped
43 Toyama-cho, Shinjuku-ku, Tokyo, Japan

Type of study:

Development of instruments for training

The project was completed in 1971

Type of speech defect:

Speech defect due to auditory feedback

Project result:

The project has resulted in a technical aid/instrument,
which is in regular use

Industrial production is ongoing

Manufacturer's name and address:

RION Co., Ltd., 3-20-41 Higashimotomachi, Kokubunji-
shi, Tokyo, Japan

Documentation:

Ishitoya, E. Development of a Hoseiki (Voice Recogni-
tion Aid). Bulletin of the Tokyo Metropolitan Rehabili-
tation Center for the Physically and Mentally Handi-
capped. 1971 (pp 35-38).

Project No. 47**Title of project:**

Effects of Delayed Auditory Feedback (DAF) on
Stutterers

Principal investigator:

Masaaki Nagafuchi, MD
Department of Audiology & Speech Pathology
Faculty of Education, Tohoku University
980 Sendai, Japan

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project started in 1975 and is estimated to be com-
pleted in 1977

Type of speech defect:

Stuttering

Project result:

The project has resulted in a technical aid/instrument,
which is now being tested in rehabilitation work

Industrial production is ongoing

Market introduction is planned for 1976

Manufacturer's name and address:

Rion Company Ltd, c/o Ikeda Build., Yoyogi 2-2-7,
Shibuya-ku 151, Tokyo, Japan

Project description:

The study was done to compare the speech behavior of
stutterers and nonstutterers under delayed auditory feed-
back (DAF).

It was revealed that the speech behavior of normal group
was disturbed with DAF, most disturbed at delay time of
200 msec and about 100 dB SPL, and as for stutterers,
the stuttering was reduced under delay time between 50
and 150 msec with about 80 dB SPL.

Recently, the portable stuttering aid was devised. Its size
is 80 x 54 x 18 mm like a hearing aid, sound volume be-
ing adjustable, delay time also adjustable ranging from
20 to 140 msec, battery is 2.4 to 2.6 volt. The effect of
this portable stuttering aid is planned to check on
stutterers from now. The result will be obtained in 1977.

Project No. 48**Title of project:**

Stuttering Aid Using Delayed Auditory Feedback

Principal investigator:

Masaaki Nagafuchi, MD
Dept. of Audiology & Speech Pathology,

Faculty of Education, Tohoku University
980 Sendai, Japan

Type of study:

Development of instruments for training

The project started in 1974 and is estimated to be com-
pleted in 1977

Type of speech defect:

Stuttering

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is not planned

Project description:

This project is aimed to study the speech behavior of

stutterers and nonstutterers under delayed auditory feedback condition and auditory masking.

The speech behavior of normal group was most disturbed at delay time of 200 msec. The effects of delayed auditory feedback on the male were greater than the female. As for stutterers, the stuttering was most reduced under the delay time of 50 to 150 msec.

The auditory masking reduced stuttering. The binaural masking was more effective than the monaural one.

A stuttering aid will be planned with results of this basic study.

Project No. 49**Title of project:**

Communicator (Wrist Typewriter)

Principal investigators:

Saburo Nagata; Canon Inc. 11-28 Mita 3-chome, Minato-ku, Tokyo 108, Japan

Dr. J. M. A. van Mierlo; Huize "Zonhove" Nieustraat 70 SON, Netherlands

Dr. van Uden; Instituut voor Doven Sint-Michielsgestel The Netherlands

Type of study:

Development of technical aids for personal usage

The project started in 1973 and is estimated to be completed in 1977

Type of speech defect:

Conversation aid for the speech disabled unable to communicate thru writing and a writing aid for those unable to manage writing by writing instrument

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is ongoing

Market introduction is planned for 1977

Manufacturer's name and address:

Canon Inc., 11-28, Mita 3-chome, Minato-ku, Tokyo, Japan. Mailing address: P.O.Box 50, Tokyo Airport, Japan

Patent is now being applied for

Project No. 50**Title of project:**

"PAT" Pre-Audiometric Test Instrument

Principal investigator:

Odd Dahl, SCASE A/S Eidsvågbakken 1, 5080 Eidsvåg, Norway

Type of study:

Development of instruments for diagnosis

The project was completed in 1974

Type of speech defect:

For testing of infants' hearing at control centres

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

SCASE A/S
Eidsvågbakken 1, 5080 Eidsvåg
Norway

Documentation:

Leaflet on PAT: Pre-audiometric instrument. SCASE, Scandinavian Control and System Engineering A/S, Eidsvågskakken 1, 5080 Eidsvåg, Bergen, Norway

Leaflet on PAT: Pre-audiometric Test Instrument for the testing of infants' hearing at control centres. SCASE, Eidsvågskakken 1, 5080 Eidsvåg, Bergen, Norway

Project No. 51**Title of project:**

"SAM" Tactile Wireless Warning System

Principal investigator:

Odd Dahl, SCASE A/S, Eidsvågskakken 1, 5080 Eidsvåg, Norway

Type of study:

Development of technical aids for personal usage

The project was completed in 1973

Type of speech defect:

Personal Call system

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

SCASE A/S, Eidsvågbakken 1, 5080 Eidsvåg

Documentation:

Paper presenting the Sam Tactile Wireless Warning System. SCASE A/S, Eidsvågbakken 1, 5080 Eidsvåg, Norway.

Project No. 52**Title of project:**

Phonospectroscopy in Physio-Pathology of Speech

Principal investigator:

Phon. Dep. of Laryngol. Clinic Institute of Surgery Medical School Warsaw a. Acoustic Dep.
Institute of Fundamental Technological Research
Polish Academy of Sciences 02-097 street Banacha 1 A
Warsaw, Poland

Type of study:

Development of instruments for training

Development of instruments for diagnosis

The project started in 1975 and is estimated to be completed in 1980

Type of speech defect:

Cleft palate, vocal cords paralysis, deafness, dysphonie

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Market introduction is planned for 1980

Manufacturer's name and address:

Acoustic Dep. IPPT Polish Academy of Sciences Warsaw

Patent No.

325

Documentation:

Otolaryngologia Polska, 1973, 3

Project No. 53**Title of project:**

Application of Reverberation Systems by the Therapy of Stammering

Principal investigator:

Doc. Dr. Bogdan Adamczyk,
Institute of Physics, Maria Curie-Skłodowska University
Nowotki 10, 20-031 Lublin, Poland

Type of study:

Statistical and/or need analysis study

Development of instruments for training

Development of instruments for diagnosis

Development of technical aids for personal usage

The project started in 1971 and is estimated to be completed in 1980

Type of speech defect:

Stuttering

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1980

Manufacturer's name and address:

Institute of Physics, Maria Curie Skłodowska University,
Nowotki 10, 20-031 Lublin, Poland

Patent No.

47696 - Poland

Project description:

In connexion with the broad application of "ECHO" method (in Poland in about 130 centres of speech therapy) (1-3) in the therapy of stuttering and also in connexion with the study of the influence of reverberation on the speech of stuttering people (4), the authors carried out measurements the aim of which was to determine the dependence of the intensity of stuttering and the velocity of speech on the time delay of echo and the time of reverberation. The received parameters will allow to get the best conditions of the therapy of stuttering in the "ECHO" method and also in the reverberation method which is now being worked out by the authors.

The apparatus that was used allowed to regulate echo within the range from .04 s to .32 s and reverberation within the range from .4 s to 2.4 s.

The results of these tests shows that the application of reverberation does not cause so great slowing down of speech as the application of echo. So it seems quite real to apply reverberation in the therapy of stuttering. The

more reason is that the construction of the systems producing reverberation can be much simpler than the echo-correctors of speech that are used at present.

Documentation:

1. Adamczyk, B.: Anwendung des Apparates für die Erzeugung von künstlichem Widerhall bei der Behandlung des Stotterns. *Folia phoniat.* 11: 216–218 (1959).
2. Adamczyk, B.: Psychotherapeutische Faktoren der Behandlung des Stotterns mit der "Echomethode". *Folia phoniat.* 21: 300–306 (1969).

3. Adamczyk, B.: Die Ergebnisse der Behandlung des Stotterns durch das Telephonechosystem. *De Therapia Vocis et Loquela.* Societatis Internationalis Logopaediae et Phoniatriae XIII Congressus Vindobonae Anno MCMLXV. 1: 433–435 (1965).

4. Adamczyk, B., Sadowski, E and Kuniszyk-Józkowiak, W.: Influence of Reverberation on Stuttering. *Folia phoniat.* 27: 1–6 (1975).

Project No. 54

Title of project:

Application of Reverberation Systems by the Therapy of Stammering

Principal investigator:

Doc. Dr. habil. Bogdan Adamczyk,
Institute of Physics, Maria Curie-Skłodowska University,
Nowotki 10, 20–031 Lublin, Poland

Type of study:

- Statistical and/or need analysis study
- Development of instruments for training
- Development of instruments for diagnosis
- Development of technical aids for personal usage

The project started in 1971 and is estimated to be completed in 1980

Type of speech defect:

Stammering

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1980

Documentation:

Adamczyk, B., Sadowska, E and Kuniszyk-Józkowiak, W.: Influence of Reverberation on Stuttering. *Folia phoniat.* 27 (1975), (pp 1–6).

Project No. 55

Title of project:

Application and Development of ECHO-Apparatus by the Treatment of Stammering

Principal investigator:

Doc. Dr. habil. Bogdan Adamczyk,
Institute of Physics, Maria Curie-Skłodowska University,
Nowotki 10, 20–031 Lublin, Poland

Type of study:

- Statistical and/or need analysis study
- Development of instruments for training
- Development of instruments for diagnosis
- Development of technical aids for personal usage
- The project started in 1957 and is estimated to be completed in 1980
- The project was partially completed in 1968

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

The equipment is introduced on the market

Manufacturer's name and address:

Institute of Physics, Maria Curie-Skłodowska University,
Nowotki 10, 20–031 Lublin, Poland

Documentation:

Adamczyk, B.: Psychotherapeutische Faktoren der Behandlung des Stotterns mit der "Echomethode". *Folia phoniat.* 21 (1969), pp 300–306.

Adamczyk, B.: Trening i psychoterapia w metodzie „Echo”. *Logopedia* 10, (1971), pp 45–55.

Map describing speech correction centers in Poland where the ECHO-method has been applied.

Type of speech defect:

Stammering

Title of project:

An ECHO-Telephonic System for the Treatment of Stammering

Principal investigator:

Doc. Dr. habil. Bogdan Adamczyk,
Institute of Physics, Maria Curie-Skłodowska University,
Nowotki 10, 20-031 Lublin, Poland

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project was completed in 1962

Type of speech defect:

Stammering

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

The equipment is introduced on the market

Manufacturer's name and address:

Institute of Physics, Maria Curie-Skłodowska University,
20-031 Lublin, Poland (by cooperation of Ministry of Telecommunication).

Patent No.

47696 (Poland)

Documentation:

Patent document

Adamcyk, B: Die Ergebnisse der Behandlung des Stotterns durch das Telephonechosystem. De Therapia Vocis et Lonquela. Vol. I, Societatis Internationalis Logopaediae et Phoniatriae XIII Congressus Vindobonae Anno MCMLXV. Acta.

Description on the distribution in Poland of the ECHO-telephonic system for treatment of stammering.

Project No. 57**Title of project:**

Communication Boards for Non Verbal Severely Handicapped Dysarthrics, Aphasics and Unintelligible Pseudo-Bulbar Palsies

Principal investigator:

(Mrs) Audrey Shavell, Senior Speech Therapist,
Forest Town School for Cerebral Palsied Children,
Private Bag X2,
Parkview, Johannesburg, South Africa

Type of study:

Development of technical aids for personal usage

Type of speech defect:

Dysarthria
Aphasia
Pseudo Bulbar Palsy

Project No. 58**Title of project:**

Clinical Application of Methods for Acoustic Analysis of Voice

Principal investigator:

Fritzell, Björn
Department of Phoniatics
Huddinge sjukhus
S-141 86 Huddinge
Sweden

Type of study:

Development of instruments for diagnosis
The project started on Sept. 1, 1975 and is estimated to be completed in June 1978

Type of speech defect:

All kinds of voice disorders

Project result:

The project has not resulted in a technical aid/instrument

Project description:

The project is carried out in collaboration with the Department of Speech Communication of the School of Technology, Stockholm.

The aim is to make procedures for the acoustic analysis of voice clinically applicable. Primarily, four features will be studied: 1) fundamental frequency 2) long-time average spectrum 3) "hoarseness", and 4) glottic source function by means of inverse filtering.

Research procedures will be used in the study of a clinical population of various voice disorders. Significant findings will form the base for developing instruments, which will provide phoniatrists and logopedists with simple and preferably unexpensive tools to record relevant acoustic voice parameters in clinical practice.

The project is still in its initial stages, and no reports have yet been published.

Project No. 59

Title of project:

Technical Aid for Anarthria and Ataxia with Word Memory

Principal investigator:

Lindberg, Bengt & Höök, Olle,
Institute of Rehabilitation Medicine,
Övre Husargatan 38,
S-413 14 Göteborg, Sweden

Type of study:

Development of technical aids for personal usage

The project was completed in 1975

Type of speech defect:

Anarthria

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is planned

The equipment was introduced on the market in 1975

Manufacturer's name and address:

Engineer Thor Erstad, Terab AB, Box 169, S-437 00 Lindome

Project No. 60

Title of project:

Glottographic Registrations of Laryngeal Vibrations under Normal and Pathological Conditions

Principal investigator:

Peter Kitzing
ENT-Department
Malmö General Hospital
S-214 01 Malmö
Sweden

Type of study:

Development of instruments for diagnosis

The project started in 1975 and is estimated to be completed in 1977

Type of speech defect:

Voice disorders

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Project description:

The two most common methods for glottography—electroglottography and photoglottography—have been in regular use for considerable time but few studies of their usefulness in clinical work have been made, especially as far as photoglottography is concerned. In order to fulfill this need a system for simultaneous electro- and photoglottographic recordings has been developed and applied to systematic investigations of phonatory patterns before and after voice therapy and phonosurgery in patients suffering from various types of voice disorders.

The light used for the photoglottogram enters the subglottic space through the skin via a flexible fiberoptic bundle connected to a cold-light fountain and the light sensitive transistor is placed in a thin plastic catheter and introduced into the pharynx through the nose. The glottographic signals are stored on magnetic tape together with the speech signal and the measurements are made from mingograms with a high temporal resolution.

The open quotient, $Oq = O/T$, and the speed quotient, $Sq = C-O/O-C$, are measured for 20 consecutive vibratory cycles during sustained vowel sounds and short passages of running speech. These quantitative measurements are further correlated with perceptual evaluations of the patient's voice.

Project No. 61

Title of project:

System PMV

Principal investigator:

Palmstiernas Mekaniska Verkstad AB
Döbelnsgatan 34 C
113 52 Stockholm
Sweden

Type of study:

Development of instruments for training

The project was completed in 1975

Type of speech defect:

Motor handicapped persons

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Palmstiernas Mekaniska Verkstad AB, Döbelnsgatan 34 C, 113 52 Stockholm

Documentation:

Leaflet on The PMV System, Technical writing aids for the handicapped. PMV AB, Döbelnsgatan 34 C, S-113 52 Stockholm, Sweden.

Leaflet on The PMV System Accessories. PMV AB, Döbelnsgatan 34 C, S-113 52 Stockholm, Sweden.

Leaflet on PMV, Stockholm, Sweden.

Project No. 62**Title of project:**

Voice Function in Recurrent Nerve Palsy

Principal investigator:

Rune Stenborg
Foniatriska avdelningen
Sahlgrenska sjukhuset
413 45 Göteborg
Sweden

Type of study:

Development of instruments for diagnosis
The project is planned to start in 1976

Type of speech defect:

Voice dysfunction

Project result:

The project has not resulted in a technical aid/instrument

Project description:

The questions to be studied are

1) what is typical concerning acoustic properties, air flow and vocal fold position for recurrent nerve palsy of different etiology

2) what prognostic judgements can be done from these data

Methods to be used are acoustic voice analysis, measurement of transglottal air flow and resistance, photographs of the vocal folds and EMG.

Project No. 63**Title of project:**

Speech Amplifier

Principal investigator:

Karoly Galyas
Department of Speech Communication
Royal Institute of Technology (KTH)
S-100 44 Stockholm 70, Sweden

Type of study:

Development of technical aids for personal usage
The project started in 1972 and was completed in 1976

Type of speech defect:

Weak voice (vocal cord paralysis, laryngectomy, Parkinson's disease etc.)

Project result:

The project has resulted in a technical aid/instrument, which is in regular use
Industrial production is ongoing
The equipment is introduced on the market

Manufacturer's name and address:

AB Special Instrument, Box 27066, S-102 51 Stockholm
Sweden

Project description:

Persons with weak voice (often as a result of Laryngectomy, paresis etc.) need an amplification of their speech in order to be heard. High gain, good sound quality, good battery economy and avoidance of disturbing whistling was required. A speech amplifier has been developed for these groups of handicapped.

Special features:

High gain and high power (2 W)

Low distortion

High resistance to acoustic howling

Special sensor for howling (when mic. is held close to the loudspeaker) reduces sound intensity to a low whistling

Rechargeable batteries with quick charge incorporated

Low power drain in quiet intervals

Head microphone available as extra accessory

Size 24 x 65 x 150 mm

Weight ca 300 gr

Project No. 64

Title of project:

Artificial Larynx with Intonation Control

Principal investigator:

Karoly Galyas
Department of Speech Communication
Royal Institute of Technology (KTH)
S-100 44 Stockholm 70, Sweden

Type of study:

Development of technical aids for personal usage

The project started in 1973 and is estimated to be completed in 1978

Type of speech defect:

Laryngectomee

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

An artificial larynx has been constructed which has as its

design goals the improvement of speech naturalness and an easy manageability of hardware. The most important feature for the improvement of the naturalness of speech is the possibility to continuously control the frequency variation and thus the important possibility of producing natural intonation variations. The vibrator unit, which is fastened to the neck with an elastic band, is separated from the control unit which is held in the user's hand. The battery and the electronic circuitry is housed in a pocket sized box.

Control of the pitch and the amplitude is made by pressure from the thumb, while the pitch is changed by the movement of two fingers. Also incorporated is the possibility to vary the parameters which adapt the artificial larynx to the individual user's personal needs.

Experiments indicate clearly that both normals and laryngectomees were successful in learning to use this device. These patients, then, acquired access to a linguistic feature of great importance not only for the intelligibility but also for emotional expression. While the degree of the success was partly dependent on, for the patients, age and emotional adjustment to their handicap, there seems to be a group of laryngectomized individuals whose speech quality could be improved in terms of naturalness and intelligibility through the use of this artificial larynx.

Project No. 65

Title of project:

A Word Store System with Speech Output

Principal investigator:

Johan Liljencrants
Department of Speech Communication
Royal Institute of Technology (KTH)
S-100 44 Stockholm 70, Sweden

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project is going on and estimated date of completion is 1978

Type of speech defect:

Mutism

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Project description:

Principles of word store systems have been investigated through computer simulations. Special interest has been paid to the linguistic organization of the system. A comparatively big vocabulary, several hundred words, is conveniently accessed through page organization where words on individual pages are linguistically coherent. The possibilities to change vocabulary and input (search) methods have been guiding ideas in the design work. Speech output has been planned as an alternative to writing. There is an obvious application of a general text-to-speech system, see "Speech Synthesis From Text" project. In medium sized vocabulary systems a quality gain is possible by using different speech coding techniques based on analysis of human speech. One such system based on microcomputer and a hardware LPC synthesizer is being developed along with more straightforward speech output techniques for small vocabulary systems.

Documentation:

G. Jismalm (1973): "Kommunikationshjälpmedel för tal-skadade. Ordminnessystem med språklig organisation", Speech Transmission Laboratory, Technical Report May 15, 1973 (KTH, Stockholm).

Title of project:

Speech Synthesis from Text

Principal investigators:

Rolf Carlson and Björn Granström
Department of Speech Communication
Royal Institute of Technology (KTH)
S-100 44 Stockholm 70, Sweden

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in 1974

Type of speech defect:

Mutism

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work
Industrial production is planned
Market introduction is not planned

Project description:

The project is concentrated on the problem to convert

ordinary text to synthetic speech. The text could be given from different kinds of facilities like type-writers, word store systems, or communication boards. The system is general and produces speech from an unlimited vocabulary. A minicomputer is used to transform the text to a phonetic transcription. The transcription generates control parameters to a speech synthesizer.

The basic feature of the system to transform unrestricted text to speech makes a variety of applications possible. One application for the speech impaired that we have tried is in telephone communication. The handicapped generates a text through operating, e.g. a keyboard. To speed up the typing certain combinations of symbols have been programmed to result in frequently used words, phrase fragments, or sentences. The resulting text is transformed to synthetic speech that is transmitted to the receiver.

The same system has also been tried in a classroom situation, to give the handicapped greater possibilities to actively interact with the teacher and fellow pupils. There is a common opinion that the mentioned application of speech synthesis positively will add to the general motivation, language training, and development of the handicapped individual.

Project No. 67**Title of project:**

Voice-Mirror-Linguamat

Principal investigator:

Nähma AG, 6314 Unterägeri, Switzerland

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in 1975 and is estimated to be completed in 1977

Type of speech defect:

Aphasia, Dysarthria

Project result:

The project has resulted in a technical aid/instrument

Industrial production is planned

Market introduction is planned for 1977

Manufacturer's name and address:

Prentice-Hall Inc. Englewood Cliffs, New Jersey

Patent No.

US 3516 175

and European patents

Documentation:

Leaflet on Voice Mirror. Prentice-Hall Learning Systems, Inc. A Subsidiary of Prentice-Hall, Inc. Englewood Cliffs, New Jersey 07632, USA.

Leaflet on Voice-Mirror-Linguamat. Nähma AG, Fabrik für Präzisionsapparate, 6314 Unterägeri, Schweiz.

Project No. 68**Title of project:**

"The Lightwriter"

Principal investigator:

T. Churchill, C. Sc.
20, Pantons Street
Cambridge, CB2 1HP
United Kingdom

Project result:

The project has resulted in a technical aid/instrument
Industrial production is ongoing
The equipment is introduced on the market

Documentation:

Leaflet on the Lightwriter, Toby Churchill Ltd., 20 Pantons Street, Cambridge, CB2 1HP, United Kingdom.

Project No. 69

Title of project:

Assessment of Computer Based Speech Training Aid and Development of Micro-Processor Version

Principal investigator:

Dr. F. Fallside
Cambridge University
Engineering Department
Trumpington St, Cambridge CB2 1PZ, UK

Type of study:

Development of instruments for training

The project started on 1 August, 1976 and is estimated to be completed on 31 July, 1979

Type of speech defect:

Resulting from deafness

Project result:

The project has resulted in a technical aid/instrument,

which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1978

Project description:

The aid is for single sound training based on display of vocal tract shape using target and attempt. It is being assessed in Classroom in local school center for deaf (partial hearing unit) using specific training schedules with continuous recording of progress and comparison with control group.

The existing aid is portable but large and expensive and so the microprocessor version is being developed for small size and portability and at a cost within school budgets.

The aid is based on earlier work 1, 2. Further research continues on extending the procedure to the training of continuous speech and this will be reported in due course.

Project No. 70

Title of project:

Bliss Symbol Communication Project

Principal investigator:

N. D. Ring
Experimental Workshop
Chailey Heritage (Craft School and Hospital)
North Chailey, Lewes, Sussex
United Kingdom

Type of study:

Development of technical aids for personal usage

The project started in 1975

Type of speech defect:

Non-speaking

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Comments:

A range of equipment is being developed but is not yet at a level which I wish to give details for publication.

Project No. 71

Title of project:

A Palatal Training Appliance and a Visual Aid for Use in the Treatment of Hypernasal Speech

Principal investigator:

Mr. W. G. Selley F.D.S., R.C.S. (Eng.)
Royal Devon & Exeter Hospital (Heavitree)
Exeter, Devon,
United Kingdom

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project was completed in 1974

Type of speech defect:

Hypernasality

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Medical Innovations Limited, 11, North Hill, Colchester, CO1 1EA Essex, England

Patent No.

36844/73

Project description:

Congenital or acquired hypernasal speech due to a poorly moving soft palate is difficult to treat due to the poor feed-back.

The use of an oral Palatal Training Appliance and Electrical visual Aid is an effective means of treating these patients in 4-6 months with minimal supervision from a speech therapist.

The optimism recorded in the preliminary report in the

British Journal of Disorders of Communication Volume 9, Number 2, 1974 was justified. Reprints available.

The Palatal Training Appliance is also effective in treating persistent dribbling and dysphagia in Cerebral Palsy children and adults having had a Cerebral Vascular Accident (stroke or trauma).

Project No. 72

Title of project:

Speech Display

Principal investigator:

D. Boston
Scientific and Technical Department
Royal National Institute for the Deaf
105 Gower St
London W.C.1
United Kingdom

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in 1971

Type of speech defect:

Speech defects due to deafness

Project result:

The project has resulted in a technical aid/instrument, which is in regular use
Industrial production is ongoing

Market introduction is planned for 1977

Manufacturer's name and address:

A & M Hearing Aids, Kelvin Way, Crawley, Sussex, England

Comments:

This is one device of a number we have under development

Documentation:

Boston, D W: An Instrument Facilitating the Perception and Discrimination of Voiced Sounds and Fricatives Using a Single Vibrotactile Cue. Research Note, Royal National Institute for the Deaf, 105 Gower Street, London W.C.1.

Boston, D W: Synthetic Facial Communication. British Journal of Audiology. (1973) No 7, (pp 95-101).

Datasheet on V.S.F. Indicator. A & M Hearing Aids Ltd, 7 Kelvin Way, Crawley, Sussex.

The Royal National Institute for the Deaf. Oscilloscope Speech Display System with Versatile Low Cost Store (Paper).

Project No. 73

Title of project:

Speech Training and Auditory Assessment Using Speech Patterns

Principal investigator:

A. J. Fourcin, Ph. D.,
Department of Phonetics & Linguistics,
University College London,
Gower Street, London WC1E 6BT
England, United Kingdom

Type of study:

Statistical and/or need analysis study
Development of instruments for training
Development of instruments for diagnosis
Development of technical aids for personal usage

Project result:

The project has resulted in a technical aid/instrument, which is in regular use
Industrial production is ongoing
The equipment is introduced on the market

Manufacturer's name and address:

Laryngograph Ltd., 24 Highclere Drive, Hemel Hempstead, Herts, HP3 8BY, England

Patent No.

3269/75

Documentation:

Fourcin, A J: Language Development in the Absence of Expressive Speech. Reprinted from: Foundations of Language Development, Vol. 2. New York: Academic Press Inc., 1975 (pp 263-268).

HEARING, Published by The Royal National Institute for the Deaf, 105 Gower Street, London WC1E 6AH, Vol. 29 (September 1974), No 9.

Fourcin, A J and Abberton, E: The Laryngograph and the Voicscope in Speech Therapy. XVIth Int. Congr. of Logopedics and Phoniatrics. (1976), pp 116-122.

Fourcin, A J: Speech Perception in the Absence of Speech Productive Ability in O'Connor N. (Ed.). Language, Cognitive Deficits, and Retardation. (Paper). London: Butterworths, 1975 (pp 33-43).

Project No. 74

Title of project:

Development of a Nasal Anemometer for Use in the Treatment of Hypernasal Speech

Principal investigator:

Mr. R. E. Ellis
Senior Experimental Officer,
Medical Physics Group,
The University of Exeter,
Exeter, Devon, England

Type of study:

Development of instruments for training

Development of instruments for diagnosis

The project started in October 1974 and is estimated to be completed in October 1976

Type of speech defect:

Hypernasality

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is not planned

Documentation:

A paper is now being prepared. It is hoped this will be available later this year. (1976).

Project description:

This project is concerned with the development of apparatus, for use by the speech therapist, to quantify hypernasality, and to assess improvement after treatment. An anemometer has now been constructed and a control group of *normal* subjects is being studied. Significant differences have already been demonstrated between normal speakers and patients with defects of the soft palate. The speech therapy centre in Exeter is also evaluating the instrument from a user basis.

Project No. 75

Title of project:

Talking Brooch

Principal investigator:

Dr. A. F. Newell,
Department of Electronics,
The University,
Southampton, SO9 5NH,
United Kingdom

Type of study:

Development of technical aids for personal usage

The project was completed in 1976

Type of speech defect:

Those with written language but inadequate speech

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction see below

Manufacturer's name and address:

See below

Comments:

April 1976. The University is producing a limited number of Talking Brooches which are available for sale. The University is also negotiating with manufacturers with a

view to licencing the commercial production of the device.

Project description:

The 'Talking Brooch' has been developed as a communication aid for those who are deaf or dumb. It consists of a small illuminated display panel which is controlled by a typewriter style keyboard. Messages are typed onto the keyboard and appear as alphanumeric characters on a display panel.

The letters of the message move across the brooch from right to left in a similar way to the news displays on some buildings. Although only a few letters are seen at any one time, long words can easily be read as they move smoothly across the brooch. A significant part of the research work was concerned with the design of the display. Experimental results showed that a five letter display was more than adequate for an aid of this type and that the use of a smoothly rolling display was very important.

The display panel is small enough to be worn as a brooch on the jacket; the complete device is easily portable and small enough to be conveniently used in almost all communication situations. It is powered by rechargeable batteries. The keyboard has a standard typewriter layout and can either be operated in the normal way or held in one hand and operated with the other. The keyboard can be used with a keyguard.

Trials with disabled people have shown that this communication aid is very suitable for conversation between

people and is a considerable improvement over currently available techniques. The style and positioning of the display make for easy and natural communication. Users have commented particularly on the socialising effect of this particular communication aid.

The aid was originally intended for people with language who were unable to speak. It has application however for the deaf—either being worn by people who cannot articulate well enough to be understood by strangers, or being operated by the person talking to the deaf, and used as an aid to lip reading.

Future developments:

Attention is being paid to the use of the brooch in conjunction with special input devices (specially designed keyboards, and keyboards for the physically handicapped). In addition the brooch, with suitable adaption,

could be used with standard telephone receivers to form a portable telephone communication system for the deaf or dumb.

Documentation:

"The Talking Brooch—A New Communication Aid". A.F. Newell, J.D.E. Beynon, P.J. Brumfitt, K.S. Joussan—5th International Conference on Rehabilitation, London, July 1974.

"The Talking Brooch a Communication Aid", in "Aids for the Severely Handicapped". Sector Publishing Limited, 1974. (Ed. K. Copeland).

"An Alphanumeric Display as a Communication Aid for the Dumb". A.F. Newell, J.D.E. Beynon, P.J. Brumfitt & I. K. S. Houssain. Medical & Biological Engineering, January, 1975.

Project No. 76

Title of project:

Communication Aids Assessments and Display Area

Principal investigator:

Maurice LeBlanc
Rehabilitation Engineering Center
Children's Hospital at Stanford
520 Willow Road
Palo Alto, California 94304, USA

Type of study:

Development of instruments for diagnosis

The project was completed in 1975

Type of speech defect:

Non-verbal Cerebral Palsy Children

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

No industrial production is planned or ongoing

Market introduction is not planned

Comments:

The purpose is to have many aids and controls which are available commercially to evaluate children with them before they are prescribed and purchased. See the 1975 Annual Report

Documentation:

First Annual Report. The Rehabilitation Engineering Center. Children's Hospital at Stanford, 520 Willow Road, Palo Alto, California, 1975.

Project No. 77

Title of project:

Small, Portable Communication Unit with Keyboard, Display, and Printer

Principal investigators:

Maurice LeBlanc
Rehabilitation Engineering Center
Children's Hospital at Stanford
520 Willow Road
Palo Alto, California 94304, USA

Joint Effort

John Crandall
Communication Aids
1400 Coleman Avenue
Santa Clara, Calif. 95050, USA

Type of study:

Development of technical aids for personal usage

The project was completed in March 1976

Type of speech defect:

Non-verbal cerebral palsy children

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Communication Aids, 1400 Coleman Avenue, Santa Clara, Calif. 95050, USA

Documentation:

Datasheet on Mini-Comm. Communication Aids. 1400 Coleman Avenue, Santa Clara, California, USA.

Project No. 78

Title of project:

Relatively Inexpensive Speech Output Device Using Small Random-Access Tape Recorder

Principal investigators:

Maurice LeBlanc and Charles Lingel
Rehabilitation Engineering Center
Children's Hospital at Stanford
520 Willow Road
Palo Alto, California 94304, USA

Type of study:

Development of technical aids for personal usage

The project started in April 1976 and is estimated to be completed in June 1976

Type of speech defect:

Non-verbal cerebral palsy children

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project No. 79

Title of project:

Matrix Communicator (with and without memory)

Principal investigator:

Armand F. DuFresne
Consulting Engineer
DUFCO
901 Iva Court
Cambria, California 93401
USA

Type of study:

Development of instruments for training
The project was completed in 1975/1976

Type of speech defect:

For use by speechless persons who are physically handicapped

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

DUFCO, 901 Iva Court, Cambria, California 93401, USA

Patent No.

U.S. patents pending

Documentation:

Palmer, R: Omegan Armand Du Fresne's Matrix Communicator Helps. The Omegan, August 1974. Institute for Executive Research, 1423 Clencrest Terrace, Glendale, California 91208, USA.

Leaflet on Matrix Communicator, Models MC3 and MC3M, Paper on Setup and Operating Instructions & Pricelist. DUFCO, 901 Iva Court, Cambria, California 93428, USA.

Project No. 80

Title of project:

Communication Disorders Service

Principal investigator:

Chris Hagen, Rancho Los Amigos Hosp.
7601 E. Imperial Hwy
Downey, Calif. 90242
USA

Type of study:

Development of technical aids for personal usage
The project started in 1972

Type of speech defect:

Dysarthria

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

Market introduction is not planned

Manufacturer's name and address:

It is made at Rancho Los Amigos Hosp.

Documentation:

Hagen, Chris, Porter, Wayne and Brink, Joyce: Non-verbal communication: An alternate mode of communication for the child with severe cerebral palsy. Journal of Speech & Hearing Disorders, XXXVIII, 4, pp 448-455.

Title of project:

Wearable Electrotactile Sensory Aid for the Deaf

Principal investigator:

Frank A. Saunders, Ph. D.
Smith-Kettlewell Institute
2232 Webster Street
San Francisco, Calif. 94115
USA

Type of study:

Development of technical aids for personal usage

The project started in 1970

Type of speech defect:

Profound deafness

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for about 1980

Documentation:

Saunders, F. A., Hill, W. A. and Simpson, C. A: Speech Perception via the Tactile Mode. A Progress Report, Smith-Kettlewell Institute and Department of Visual Sciences, University of the Pacific, San Francisco, Ca 94115, USA.

Project No. 82**Title of project:**

Design and Testing of an Intraoral Electrolarynx (Zwitman/Knorr) for Laryngectomy Patients

Principal investigator:

Daniel H. Zwitman, Ph. D.
UCLA Medical School
62-202 CHS
10833 Le Conte Avenue
Los Angeles CA 90024
USA

Type of study:

Development of technical aids for personal usage

The project was completed on November 30, 1976

Type of speech defect:

Laryngectomy/esophageal speech

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project No. 83**Title of project:**

Perceptual Test Battery

Principal investigator:

Joseph M. Wepman, Ph. D. Prof. Emeritus,
The University of Chicago
2480 Durango Circle
Palm Springs, California 92262
USA

Type of study:

Development of instruments for diagnosis

The project was completed in 1975

Type of speech defect:

Articulation-language development reading and writing

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Language Research Associates, Inc. P.O. Box 2085, Palm Springs, California 92262

Documentation:

Catalog from the Language Research Associates, Inc. P.O. Box 2085, Palm Springs, Ca. 92262, USA, 1976-1977.

Project No. 84

Title of project:

Intensive Therapy Program for Stuttering

Principal investigator:

William H. Perkins, Ph. D.
University of Southern California
734 West Adams Boulevard
Los Angeles, California 90007
USA

Type of study:

Investigation of the nature and development of stuttering.

Development of therapeutic techniques and procedures to alleviate stuttering

The project started in 1973

A new project is planned to start in 1977

Type of speech defect:

Stuttering

Project result:

The project has not resulted in a technical aid/instrument

Project No. 85

Title of project:

Maxillo-Facial Research Project

Principal investigator:

Harry Hollien, Ph. D.

Director, Institute for Advanced Study of the Communication Processes

University of Florida

Room 63, Arts and Sciences Building

Gainesville, Florida 32611, USA

Project No. 86

Title of project:

Multisensory Language Development Project

Principal investigators:

D. K. Oller and Rebecca E. Eilers
Mailman Center for Child Development
Univ. of Miami
P.O. Box 520006 Biscayne Annex
Miami, Fla. 33052
USA

Type of study:

Statistical and/or need analysis study

Development of instruments for training

Development of instruments for diagnosis

Many parts of the project have already started but no ending date is scheduled

Type of speech defect:

We deal most with speech problems associated with hearing loss. However, some of our work has dealt with Down's syndrome and other retarded children

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

Our main work is on the effects of certain handicapping conditions on the development of speech production and speech perception skills in infancy. We are now working on methods of bypassing handicaps like deafness by sensory substitution-signlanguage and tactual vocoders provide the primary substitutes we are presently investigating, although we are just getting started on this aspect of the work

Documentation:

Eilers, Rebecca E: Speech Discrimination in Young Down's Children. Presentation made to 1975 Convention of American Speech and Hearing Association. (9 pages).

Eilers, Rebecca E: Suprasegmental and Grammatical Control over Telegraphic Speech in Young Children. Journal of Psycholinguistic Research. Vol 4 (1975), No 3 (pp 227-239).

Eilers, Rebecca E., Oller, Kimbrough D. and Ellington, Judy: The acquisition of word-meaning for dimensional adjectives: the long and short of it. J. Child Language 1 (1974), (pp 195-204).

Eilers, Rebecca E. and Minifie, Fred D: Fricative Discrimination in Early Infancy. Journal of Speech and Hearing Research. Vol 18 (1975), No 1, (pp 158-167).

Eilers, Rebecca E., Wilson, Wesley R. and Moore, John M: Developmental changes in speech discrimination in three-, six-, and twelve-month-old infants. Pre-print submitted for publication. (27 pages).

Oller, Kimbrough D: The Emergence of the Linguistic Sound System in Down's Syndrome Infants. Paper presented to 1975 Convention of the American Speech and Hearing Association. (10 pages).

Oller, Kimbrough D. and Eilers, Rebecca E: Phonetic Expectation and Transcription Validity. *Phonetica* 31 (1975), pp 288-304.

Oller, Kimbrough D. and Kelly, Charleen A: Phonological substitution processes of a hard-of-hearing child. *Journal of Speech and Hearing Disorders*, Vol 39 (1974), No 1, (pp 65-74).

Oller, Kimbrough D and Warren, Irene: On the nature of the phonological capacity. *Lingua* 39 (1976), (pp 183-199).

Project No. 87

Title of project:

Information missing

Principal investigator:

Clara M. Chaney
Brough Learning Center
1708 Jefferson
Danville, IL 61832
USA

Type of study:

Development of instruments for diagnosis

Project result:

The project has not resulted in a technical aid/instrument

Comments:

We have found the greatest aid to speech to be relaxation of facial musculature, neck, tongue, shoulder, and breathing apparatus done by a neuro-muscular therapist. The only instrument which is sometimes an aid is a vibrator. This does speed relaxation in some children.

Documentation:

Chaney, Clara M., Kephart, Newell, C: *Motoric Aids to Perceptual Training*, Charles E. Merrill Publishing Co., Columbus Ohio, 1968.

Chaney, Clara M., Miles, Nancy R: *Remediating Learning Problems: A Developmental Curriculum*, Charles E. Merrill Publishing Co., Columbus, 1974.

Glen Haven In-Service Training Program, Syllabus Learning Disabilities, Learning Pathways, Inc.

Project No. 88

Title of project:

Reed Fistula Speech Following Pharyngolaryngectomy

Principal investigators:

D. Shedd, Roswell Park Memorial Institute, Buffalo, New York

B. Weinberg, Audiology-Speech Sciences, Purdue University, West Lafayette, Ind. USA

Type of study:

Development of technical aids for personal usage

The project started in 1973

Type of speech defect:

Laryngectomy

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

No industrial production is planned or ongoing

Market introduction is not planned

Project No. 89

Title of project:

- 1) Computer Assisted Articulation Therapy
- 2) Articulation Therapy Assisted by a Data Processor

Principal investigator:

James L. Fitch, Ph. D., Speech & Hearing Clinic,
Murray State University,
Murray, KY 42071, USA

Type of study:

Development of instruments for training

Project 1) was completed in 1974

Project 2) is estimated to be completed in July 1976

Type of speech defect:

Articulation disorders

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is planned

Project description:

1) Computer Assisted Articulation therapy: Behavioral programs were developed and computer programmed. A clinician-computer interface was developed. Through the interface the clinician signalled the computer as to the appropriateness of the response and the computer sig-

nalled the clinician when to change steps, criterion, materials. Also, the computer maintained the data so that it could be recalled at any time.

2) As a result of the first study, a small data processor was developed to carry-out the functions of the computer. The data processor, built for less than \$200, performs the same decision making tasks as did the computer processor. It is portable and can be used with specially developed programs for any articulation sound.

Documentation:

Fitch, James L: Computer Assisted Programmed Articulation Therapy. A paper presented to the American Speech and Hearing Association. Las Vegas, November, 1974 (10 pages).

Fitch, James L. and Terrio, Leelen M: Computer Assisted Clinical Services. Presented to the American Speech and Hearing Association. Washington, D.C. 1975 (6 pages).

Project No. 90

Title of project:

Characteristics of Dysarthric Speech Associated with Neurologic Disease

Principal investigator:

Christy L. Ludlow, Ph. D.
Communicative Disorders
National Institute of Neurological and Communicative Disorders and Stroke
National Institutes of Health
Federal Bldg., Room 1C-14,
Bethesda, MD 20014, USA

Type of study:

Development of instruments for diagnosis

The project started in March 1975 and is estimated to be completed in October 1976

Type of speech defect:

Dysarthria(s)

Project result:

The project has not resulted in a technical aid/instrument

Project description:

Objectives: The goal of this project is to develop and evaluate measures of particular parameters of the acoustic waveform of speech which could be used for the assessment of speech production impairments associated with neurological disease.

Methods Employed: Identical testing conditions are maintained by presenting the task instructions and examples from a tape recording played at the same intensity setting on a tape recorder. Recordings are made while subjects perform tasks of extended phonation, loudness and pitch variation, pause and rate control, and rapid speech initiation. Measurements are made from the 34 sound spectrograms which result from analysis of each tape recording.

Subjects: Patients with Parkinson's disease were examined at two-week intervals over a six month period in a double-blind study of changes in medication. Presently, normal adult volunteers are being examined by the exact same procedures. In addition, a small number of patients with Huntington's Chorea and a few others with amyotrophic lateral sclerosis have been tested.

Major Findings: Measures which are made from sound spectrograms have been developed and are being evaluat-

ed for their validity and reliability in reflecting the type and degree of severity of different forms of dysarthria associated with neurological disease. These measures include:

the duration of extended phonation,

the change in rate of sentence production,

the rate of phonation initiation and termination,

the rate of syllable repetition,

the change in rate of syllable repetition over 7 secs.,

the latency of speech initiation,

the average fundamental frequency of phonation during connected speech,

the change in fundamental frequency during varying intonation,

the change in syllable duration between stressed and nonstressed linguistic contrasts,

the average sound pressure level of syllable production, and

the range in sound pressure level of syllable production.

With the exception of the last two, all these measures have been made on at least two tape recordings of each of the 25 patients with Parkinson's disease included in the study. Data analyses are presently being conducted to determine which, if any, of the measures:

a) differentiate between speech symptoms occurring in Parkinson patients in two different states (while receiving the same medication)-moderate to severe rigidity with bradykinesia and drug induced dyskinesia, and

b) differentiate between speech symptoms occurring in Parkinson patients receiving different medications; L-Dopa and Bromocriptine.

Preliminary analyses indicate that two distinctive patterns of speech production can be identified with these measures; one associated with Parkinson patients when in a state of moderate to severe rigidity and the other with drug induced dyskinesia. Confirmation of these initial findings awaits completion of the normal data. Then it can be determined which measures indicate particular deficits in speech production occurring during each of the two states, rigidity and dyskinesia.

Significance to NINCDS and Biomedical Research: The development of objective procedures for the assessment

and differential diagnosis of various types of dysarthria in adults with neurological diseases, will enable researchers and clinicians to evaluate different treatments for these patients. Information is being gained also on which aspects of the speech production process are particularly impaired in each of the neurological diseases under study. The results will contribute to our understanding of the processes of both normal and disordered speech production as well as providing directions for treatment.

Proposed Course of Project: Subject testing of normal adults will be completed by July, 1976. Data processing and analysis is expected to continue until September, 1976. Papers will be submitted for journal publication in the early fall of 1976.

Similar methods of study will be used to determine the effects of dipropyl-acetate (Depakine) on the speech production impairments of patients with cerebellar deficits.

Project No. 91

Title of project:

Prosthetic Treatment of the Laryngectomized Patient

Principal investigator:

Richard J. Grisius, Capt, DC, USN
Naval Graduate Dental School
Bethesda, MD 20014
USA

Type of study:

Development of technical aids for personal usage
The project was completed in 1972

Type of speech defect:

Laryngectomy

Project result:

The project has resulted in a technical aid/instrument, which is in regular use
No industrial production is planned or ongoing
Market introduction is not planned

Documentation:

Grisius, R. J., Moore, D. J. and Simpkins, Jr., W. T.: Prosthetic treatment of the laryngectomized patient. *Journal Prosthet. Dent.* Vol. 32 (1974), No 3 (pp 300-306).

Project No. 92

Title of project:

Glossectomy Rehabilitation by Mandibular Tongue Prosthesis

Principal investigator:

Dorsey J. Moore, Captain DC, USN
Naval Graduate Dental School
Bethesda, MD 20014, USA

Type of study:

Development of technical aids for personal usage
The project was completed in 1972

Type of speech defect:

Glossectomy

Project result:

The project has resulted in a technical aid/instrument, which is in regular use
No industrial production is planned or ongoing
Market introduction is not planned

Documentation:

Moore, D. J.: Glossectomy Rehabilitation by Mandibular Tongue Prosthesis. *The Journal of Prosthetic Dentistry.* Vol. 28 (1972), No 4 (pp 429-433).

Project No. 93

Title of project:

Cervical Esophagus Prosthesis

Principal investigator:

Dorsey J. Moore, Captain, DC, USN
Naval Graduate Dental School
Bethesda, Maryland 20014, USA

Type of study:

Development of technical aids for personal usage
The project was completed in 1969

Type of speech defect:

Laryngectomy

Project result:

The project has resulted in a technical aid/instrument, which is in regular use
No industrial production is planned or ongoing
Market introduction is not planned

Documentation:

Moore, D. J.: Cervical esophagus prosthesis. *Journal Prosthet. Dent.* Vol. 30 (1973), No 4 (pp 442-445).

Project No. 94

Title of project:

TIPSCH: A Tactile Information-Processing Substitution
Channel for Hearing

Principal investigator:

Martin C. Schultz
Hearing and Speech Div.
Children's Hospital Medical Ctr
300 Longwood Ave
Boston, Mass, USA

Type of study:

Development of instruments for training
Development of technical aids for personal usage
The project started in February 1974 and is estimated to
be completed in 1980-81

Type of speech defect:

Those associated with hearing loss

Project result:

The project has resulted in a technical aid/instrument,
which shortly is planned to be tested in rehabilitation
work

No industrial production is planned or ongoing

Market introduction is not planned

Comments:

The device is a single-transducer vibrotactile aid for use
by deaf and deaf-blind infants and children—delivers
rudimentary acoustic information including aspects of
the child's own voice.

Project No. 95

Title of project:

Sensory Aids Research Project

Principal investigator:

Arthur Boothroyd, Ph. D.
The Clarke School for the Deaf
Northampton, Massachusetts 01060, USA

Type of study:

Statistical and/or need analysis study
Development of instruments for training
The project started in 1970

Type of speech defect:

Resulting from hearing loss

Project result:

The project has resulted in a technical aid/instrument,

which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Manufacturer's name and address:

Amplifon, Milan, Italy

Documentation:

Boothroyd, A. and Damashek, M. S: Development of
Small Speech Training Aids for the Deaf—A Progress Re-
port. Clarke School for the Deaf, Research Department,
March 1975, S.A.R.P. 18.

Boothroyd, A. and Damashek, M: Development of Small
Speech Training Aids: Second Progress Report. Clarke
School for the Deaf, Research Department, February
1976, S.A.R.P. 23.

Project No. 96

Title of project:

The Use of the Portable Voice Masker in Stuttering
Therapy

Principal investigator:

Les Gruber, Ph. D.
Central Michigan University
Mt. Pleasant, Michigan 48858
USA

Type of study:

Development of technical aids for personal usage
The project was completed in 1971

Type of speech defect:

Stuttering

Project result:

In the project we were using a technical aid which already
has been introduced on the market and is regularly used
in rehabilitation work

The equipment is introduced on the market

Manufacturer's name and address:

Applied Science Enterprises

Comments:

This firm has discontinued manufacturing the Voice
Masker

Documentation:

Gruber, L: The Use of the Portable Voice Masker in
Stuttering Therapy. Journal of Speech and Hearing Dis-
orders. Vol. 36 (1971)/No 2 (pp 287-289).

Project No. 97

Title of project:

Treating Velopharyngeal Inadequacies with a Palatal Lift Prosthesis

Principal investigator:

Leo J. Kipfmüller
Central Michigan University
Moore Hall 444
Mt. Pleasant, MI 48859
USA

Type of study:

Statistical and/or need analysis study
Development of technical aids for personal usage
The project was completed in 1972

Type of speech defect:

Incompetent and insufficient velopharyngeal closure

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Prosthodontist's name and address:

Dr Brien Lang, University of Michigan, Dental School,
Ann Arbor, MI 48104

Documentation:

Kipfmüller, L. J. and Lang, B. R: Treating velopharyngeal inadequacies with a palatal lift prosthesis. The Journal of Prosthetic Dentistry. Vol. 27 (1972), No 1 (pp 63-72).

Project No. 98

Title of project:

Presurgical Maxillary Prosthesis: An Analysis of Speech Intelligibility

Principal investigator:

Leo J. Kipfmüller
Central Michigan University
Moore 444
Mt. Pleasant, MI 48859
USA

Type of study:

Statistical and/or need analysis study
Development of technical aids for personal usage
The project was completed in 1972

Type of speech defect:

Acquired cleft palate resulting from resection due to carcinoma

Project result:

The project has resulted in a technical aid which is in regular use

Market introduction is not planned

Prosthodontist's name and address:

Dr. Brien Lang, University of Michigan, Dental School,
Ann Arbor, MI 48104

Documentation:

Kipfmüller, L. J. and Lang, B. R: Presurgical maxillary prosthesis: An analysis of speech intelligibility. Journal of Prosthet. Dent. Vol. 28 (1972) No 6. (pp 620-625).

Project No. 99

Title of project:

Frequency Transposed Synthetic Speech as an Aid to Hearing Impaired Children

Principal investigator:

Susan M. Fleming
Veterans Administration Hospital
Allen Park, Michigan 48101
USA

Type of study:

Development of technical aids for personal usage
The project was completed in 1976

Type of speech defect:

Severe hearing impaired

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is planned

Market introduction is planned

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

The investigator is indebted to the manufacturer, Votrax, for modifying instrumentation used to conduct her doctoral dissertation (Wayne State University). All requests for information and material regarding instrumentation must therefore be referred directly to Vocal Interface Division

Project description:

The purpose of the study was to investigate the effect of transposed synthetic speech upon perception by hearing impaired children.

Sixty-two children, ages 6–12, were divided equally into two balanced groups designated as "trained" and "untrained" (control). Subjects had hearing losses of 45 dB SPL or greater at any of the following frequencies: 250 Hz, 500 Hz, and 1 000 Hz. All subjects were tested on 30 spondee presented in three modes: live, synthetic, and transposed synthetic speech. The latter two modes were produced by an electronic voice system. The factor of transposition was 50 per cent of normal. Older subjects meeting criteria were also tested on sentences. Subsequent to the initial test, subjects in the trained group received a total of 14 1/2 hours of training on the electronically produced modes. All subjects were then

tested again on the stimuli used in the pre-training test situation. All stimuli were presented via headphones at a mean output of 110 dB SPL.

In the pre-training tests for spondee and sentences, subjects from both the trained and untrained groups performed best on the live mode. In the posttraining tests both the trained and untrained subjects showed greatest improvement on the transposed synthetic mode. At least two factors may be responsible for this result. First, perhaps the untrained subjects needed only a second exposure to the transposed synthetic speech before demonstrating significant gains. Second, the Hawthorne effect may explain the subjectively observed increase in motivation from the subjects in the untrained group while their counterparts in the trained group improved as a result of the transposition itself. In all situations subjects performed better on sentences than spondee.

Project No. 100

Title of project:

Handi-Voice Speech Prosthesis

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of technical aids for personal usage

The project was completed in 1976

Type of speech defect:

Non-Verbal: C. P., Parkinsons Disease, M. S., A. L. S.,
Glossectomy, Laryngectomy, Stroke, Mental Retardation, Multiply Handicapped

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Project description:

Problem: Lack of a voice communication channel for non-verbals

Aim: To develop and manufacture a speech prosthesis

Main result: Handi-Voice speech prosthesis is now in production and is commercially available. Product flyer describes the device.

Documentation:

Leaflet on Votrax-Handi-Voice System. Vocal Interface Division, 500 Stephenson Highway, Troy, Michigan 48084, USA

Project No. 101

Title of project:

Input Terminal 1: Direct Selection Terminal

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of technical aids for personal usage

The project started in 1976 and is estimated to be completed in 1976

Type of speech defect:

Non-Verbal: C. P., Parkinsons Disease, M. S., A. L. S.,
Glossectomy, Laryngectomy, Stroke, Mental Retardation

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1976

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

This is an operator terminal for the Handi-Voice Speech Prosthesis

Documentation:

Handi-Voice product flyer

Project No. 102

Title of project:

Input Terminal II: Scanning Selection Terminal

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of technical aids for personal usage

The project started in 1976 and is estimated to be completed in 1977

Type of speech defect:

Non-verbal: C. P., Parkinsons Disease, M. S., A. L. S.,

Stroke, Mental Retardation, Multiply Handicapped

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

This is an operator terminal for the Handi-Voice Speech Prosthesis

Project No. 103

Title of project:

Input Terminal III: Calculator Style Terminal

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of technical aids for personal usage

The project was completed in 1976

Type of speech defect:

Non-verbal: C. P., Parkinsons Disease, M. S., A. L. S.,
Glossectomy, Laryngectomy, Stroke, Multiply Handicapped

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

This is an operator terminal for the Handi-Voice Speech Prosthesis

Documentation:

Handi-Voice product flyer

Project No. 104

Title of project:

VAST: Visually Assisted Speech Trainer

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of instruments for training

The project started in 1974 and is estimated to be completed in 1977

Type of speech defect:

Deaf and other speech impairments

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

The instrument displays articulation quality, pitch and loudness on a television screen

Project No. 105

Title of project:

Real Time Frequency Translator

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of instruments for diagnosis

The project started in 1976 and is estimated to be completed in 1977

Type of speech defect:

Deaf

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

The instrument translates intact the input sound spectrum to higher or lower frequencies in real time

Project No. 106

Title of project:

Throat Pick Up: Activator for Handi-Voice Input Terminals

Principal investigator:

Vocal Interface Division
500 Stephenson Highway
Troy, Michigan 48084
USA

Type of study:

Development of technical aids for personal usage

The project started in 1976 and is estimated to be completed in 1977

Type of speech defect:

C. P., Parkinsons Disease, M. S., A. L. S., Stroke, Multiply Handicapped

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1976

Manufacturer's name and address:

Vocal Interface Division, 500 Stephenson Highway,
Troy, Michigan 48084

Comments:

This is an articulation sensor for controlling Handi-Voice Input Terminals II and III

Project No. 107

Title of project:

Communication Aids for the Non-Verbal Handicapped

Principal investigator:

Dr. Robert G. Combs, P. E.
Department of Electrical Engineering
University of Missouri-Columbia
Columbia, Missouri 65201
USA

Type of study:

Development of instruments for diagnosis

Development of technical aids for personal usage

The project started in 1968

Type of speech defect:

Mostly cerebral palsy related defects

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Comments:

The foundation instrument is called MYOCOM but there are several ramifications other than strict communication

Documentation:

Leaflet on MYOCOM

Conference Proceedings:

1. "Myocom: Communication for Non-Verbal Handicapped", trans. of the Missouri Academy of Science, vol. 3, 1969

2. "The Woodhaven Project", Citizens Conference on Priorities and Action for Children and Youth, NCCY, Washington, D. C. December, 1971

3. "Practical Aids for Non-Verbal Handicapped", Carnahan Conference on Electronic Prosthetics, 1972

Project No. 108

Title of project:

Intelligibility of the Modified Western Electric Electrolarynx

Principal investigator:

Edward L. Goshorn, M. S.
ASP Service, 126-JB
VA Hospital
Saint Louis, Missouri 63125, USA

Type of study:

Development of technical aids for personal usage

The project started in March 1976 and is estimated to be completed in March 1977

Type of speech defect:

Alaryngeal

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Manufacturer's name and address:

Western Electric, New York, USA

Comments:

For information regarding modification write to:

Edward L. Goshorn, M. S., ASP, 126-JB, VA Hospital, St. Louis, MO 63125

Project No. 109

Title of project:

Compensatory Speech for the Total Glossectomee and for the Totally Laryngectomized Total Closessectomee

Principal investigator:

Madge Skelly, Ph. D. Chief, Audiology/Speech Pathology Service, Veterans Administration Hospital, St Louis, Mo. 63135
Professor, Communication Disorders and
Professor, Community Medicine, St. Louis University School of Medicine, USA

Type of study:

Development of techniques for training

Development of techniques for personal usage

The project started in 1968 and is estimated to be completed in 1978

Type of speech defect:

Speechlessness due to surgical removal of the total tongue (or both total tongue and total larynx) consequent to cancer

Project result:

The project has resulted in a technique which is now being tested in rehabilitation work

Comments:

Technique which uses the electrolarynx in new way

Book and video films are available

Documentation:

VIDEO CASSETTES (3/4 inch color)

VC 5 (1974) The Laryngectomized Glossectomee (30 min)

Skelly, Madge, Ph. D. and Lorraine Schinsky, M. A.

VC 86 (1975) (3/4 inch color)

Compensatory Speech for the Total Glossectomee (60 min)

Skelly, Madge, Ph. D. and Lorraine Schinsky, M. A.

BOOK:

Glossectomee speech rehabilitation

Madge Skelly, Ph. D., Robert C. Donaldson, M. D. and Rita Solovitz Fust. M. A. Charles Thomas, Publisher, Springfield, Illinois, USA

Project No. 110

Title of project:

Amerindian Sign: Gestural Communication for the Speechless

Principal investigator:

Madge Skelly, Ph. D., Chief/Audiology and Speech Pathology Service

Veterans Administration Hospital
St. Louis, Missouri 63125, USA

Type of study:

Development of techniques for personal usage

The project started in 1973 and is estimated to be completed in 1978

Type of speech defect:

Speechlessness consequent to cancer, surgery or brain damage

Project result:

The project has resulted in a technique, which is now being tested in rehabilitation work

Comments:

While this technique may not be a technical aid in the sense in which your project is planned, I believe it should be listed in your international published information sheet, as many patients who may otherwise need to use an instrument, may with instruction, use the American Indian Sign instead. (Please distinguish Amerindian Sign from the Universal Sign Language of the Deaf. Amerind is simpler, easier to learn, easier to understand, and crosses language barriers. It is not a language, but a conceptual signal system. Book and manual plus video films are in progress

Documentation:

Skelly, Madge, Ph. D., Lorraine Schinsky, M. A., Robert C. Donaldson, M. D., and John M. Griffin, M. D.:
American Indian Sign: Gestural Communication for the

Speechless, Archives of Physical Medicine and Rehabilitation, Vol. 56, 156 to 160, April, 1975.

Skelly, Madge, Ph. D., Lorraine Schinsky, M. A., Randall W. Smith, M. S., and Rita S. Fust, M. A.:

American Indian Sign: As a Facilitator of Verbalization for the Oral Verbal Apraxic, Journal of Speech and Hearing Disorders, Nov. 1974, V. 39, No. 4, 445 to 456.

Skelly, Madge, Ph. D. and Lorraine Schinsky, M. A.:

American Indian Sign: Gestural Communication for the Speechless

(Book and manual in progress, for probable publication 1977.)

Skelly, Madge, Ph. D. and Lorraine Schinsky, M. A.:

American Indian Sign: Gestural Communication for the Speechless

(Four half hour color video tapes)

Learning Resources Service, Veterans Administration Hospital, St. Louis, Missouri 63125, USA

Skelly, Madge, Ph. D.:

Video Dictionary of American Indian Sign

(Four half hour color video tapes)

Learning Resources Service, Veterans Administration Hospital, St. Louis, Missouri 63125, USA

Project No. 111**Title of project:**

Spectrally Enhanced Auditory Laterality Training for Stuttering Children

Principal investigator:

Dr. Laurence M. Hilton, Ph. D.
Speech Science Laboratory
Department of Special Education
University of Nebraska at Omaha
Box 688, Omaha, NE, USA, 68101

Type of study:

Development of instruments for training

The project is planned to start in 1977 or early 1978

Type of speech defect:

Stuttering

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is planned

Market introduction is not planned

Comments:

We are currently developing a laboratory prototype of our S. E. A. L. Trainer with the help of two electronics companies

Project description:

This project entails experimental application of an instrumental acoustic phonetic approach to the development of strong, auditory-verbal cortical laterality in stuttering children, and the effects of this methodology upon speech fluency and auditory-verbal communicative competence. The instrumentation required includes the following:

1. *Sound spectrograph* to display vowel formant patterns and determine the frequency bandwidths associated with them.

2. The instrument package we are developing which we have named the Spectrally Enhanced Auditory Laterality Trainer (S. E. A. L. Trainer). This consists of a pre-amplifier and bank of 36 1/3 octave band acoustic filters with slide attenuators designed for spectrally modified auditory sidetone feedback and auditory stimulus presentation. This is coupled with a white noise generator with variable frequency low pass filter. Output from these two instruments is directed to binaural headset receivers. While the noise masks one ear, programmed mass practice auditory perceptual/verbal encoding stimulus repetition training is passed through the S. E. A. L. trainer to the opposite ear via auditory tape and microphone. We are working with both B & K Instruments and General Radio Corporation on the development of a prototype of the S. E. A. L. Trainer at the present time.

Title of project:

Manufacturer of the SonaGraph, an Audio Spectrum Analyzer

Principal investigator:

Kay Elemetrics Corp.
12 Maple Avenue
Pine Brook, New Jersey 07058
USA

Type of study:

Development of instruments for diagnosis

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

Manufacturer's name and address:

Kay Elemetrics Corp., 12 Maple Avenue, Pine Brook, New Jersey 07058, USA

Comments:

The SonaGraph is widely used for speech research and as a clinical tool to objectively evaluate the progress of a patient's therapy.

Documentation:

Leaflet on Audio Spectrum Analyzers. KAY Elemetrics Corp, 12 Maple Ave., Pine Brook, New Jersey 07058, USA.

List of references on the use of sounds spectrography in speech disorders.

Project No. 113**Title of project:**

Instruments for Analysis, Diagnosis, Identification of Speech Defects; Speech Therapy

Principal investigator:

KAY Elemetrics Corp.
12 Maple Ave., Pine Brook, N. J. 07058
USA

Type of study:

Development of instruments for training

Development of instruments for diagnosis

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

KAY Elemetrics Corp., 12 Maple Ave., Pine Brook, N. J. 07058

Documentation:

List of references.

Leaflets on Audio Spectrum Analyzers and Sona-Graph.

Project No. 114**Title of project:**

Speech Spectrographic Display

Principal investigator:

Robert A. Houde, Ph. D.
Center for Communications Research Inc.
50 West Main Street
Rochester, New York 14614
USA

Type of study:

Development of instruments for training

Development of instruments for diagnosis

The project started in June 1974 and was completed in 1976

Type of speech defect:

All

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work by us and four other laboratories

Industrial production is planned

Market introduction is planned for 1977

Patent No.

Patent is applied for but not yet issued

Documentation:

SSD Brochure

Project No. 115

Title of project:

Evaluation of Reed Fistula Speech

Principal investigator:

Donald P. Shedd, M. D., Roswell Park Memorial Institute,
666 Elm Street, Buffalo, New York 14263
USA

Type of study:

Development of technical aids for personal usage

The project started in 1971 and is estimated to be completed in 1978

Type of speech defect:

Alaryngeal aphonia

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Documentation:

Shedd, D et al: Further Appraisal of Reed-Fistula Speech Following Pharyngolaryngectomy. The Canadian Journal of Otolaryngology, Vol. 4, (1975) No 4, (pp 583-587).

Project No. 116

Title of project:

Surgical and Prosthetic Vocal Rehabilitation of Laryngectomees

Principal investigator:

Stanley Taub, M. D., F. A. C. S.
4 East 78th Street
New York, N. Y. 10021
USA

Type of study:

Development of technical aids for personal usage

Type of speech defect:

Post-laryngectomy aphonia

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

LaBarge Corporation, 500 Broadway Building, St. Louis,
Missouri 63102, USA

Patent No.

Patent is received

Documentation:

Taub, S: Air Bypass Voice Prosthesis for Vocal Rehabilitation of Laryngectomees. Annals of Otolaryngology, Rhinology and Laryngology. Vol. 84 (1975), No 1, Page 45.

Leaflet on Voice Bak. Ray F. Mohrman, LaBarge, Inc., 500 Broadway Building, St. Louis, Missouri 63102, USA

Project No. 117

Title of project:

Design, Manufacture and Marketing of Communication Aids for the Non-Verbal Physically Handicapped

Principal investigator:

Barry A. Romich, P. E.
Prentke Romich Company
RD 2 Box 191
Shreve, Ohio 44676
USA

Type of study:

Development of technical aids for personal usage

The project started in late 1974

Type of speech defect:

Total absence of intelligible speech

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Prentke Romich Company, RD 2, Box 191, Shreve, Ohio 44676, USA

Project description:

The goal of our efforts has been the design, manufacture and marketing of electronic aids for the severely handicapped. We design with the idea of providing a basic needed function at an affordable price.

The three top priority areas of need for a severely handicapped person are Communication, assistance in Activities of Daily Living and Mobility. We are providing devices and service in all three areas.

Title of project:

Development of Communications Systems for Non-Verbal Individuals within Individual Program Services

Principal investigator:

Jerry B. Martini
Altoona Center
1515 4th Street
Altoona, Pennsylvania 16601
USA

Type of study:

Development of technical aids for personal usage

The project started on January 20, 1976

Type of speech defect:

Cerebral palsied (non-verbal)

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

Development of individual program communication systems at a center for multiply handicapped retarded individuals. Previously utilizing a type of booklet that is portable and containing pictures unique to each program. Still in the experimental stage.

Project No. 119**Title of project:**

The nature of my work is not in "project" form, rather I have been concerned personally with developing a device for non-verbal, physically handicapped persons. This has not been sponsored or supported by any agency, etc.

Principal investigator:

Michael Flahive
Department of Communication Disorders
Marywood College
Scranton, Pennsylvania 18509
USA

Type of study:

Development of instruments for training

The project started in 1973

Type of speech defect:

Primarily for non-verbal, physically handicapped individuals

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Comments:

At the present time the device is very much in a developmental state and the present employment situation does not afford a great deal of time for ongoing research with the device . . . it is anticipated, however, that in the next year more time will be applied to the refinement of the device and at that time perhaps some more concrete data and specifications can be reported

Project description:

The Slip N' Slide Communication Board was designed to meet a need of the physically handicapped, non-verbal individual. It was intended to provide a mode for expressions of an early developmental level and as a training tool for simple receptive language.

Project No. 120**Title of project:**

Cooperative Rehabilitation Engineering Center

Typewriter Platen Reverser

Principal investigator:

William A. Spencer, M. D.
Baylor College of Medicine
1333 Moursund Avenue
Houston, Texas 77030
USA

Type of study:

Development of instruments for training

Development of instruments for diagnosis

Development of technical aids for personal usage

The project started in April 1975 and is estimated to be completed in January 1977

Type of speech defect:

CP Patients

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1978

Manufacturer's name and address:

Work Activity Program of Texas Institute for Rehabilitation and Research, distributed by Medical Equipment Distributors

Documentation:

Rehabilitation Engineering Center Annual Report

1) Patient Engineering

Clinical Device Development pp. 154

2) Hardware Systems Developed

A Typewriter Platen Reverser pp. 6

Project No. 121**Title of project:**

Listening and Speech Training for the Hearing Impaired

Principal investigator:

Dr. Frederick S. Berg, Ph. D.
Department of Communicative Disorders
Utah State University
Logan, Utah 84322
USA

Type of study:

Development of instruments for training

Development of instruments for diagnosis

The project started in May 1975 and is estimated to be
completed in June 1980

Type of speech defect:

Hearing impaired (deaf and hard of hearing) primarily
but also for all types of speech defects

Project result:

The project has resulted in a technical aid/instrument,
which is now being tested in rehabilitation work

Industrial production is ongoing

The equipment is introduced on the market

Manufacturer's name and address:

Amera Incorporated, Box 627, Logan, Utah 84321

Documentation:

Berg, F. S.: Acceptance of the Video Articulator. Depart-
ment of Communicative Disorders, Utah State Univer-
sity, Logan, Utah 84322, USA.

Datasheet on Video Articulator. Amera Incorporated,
P. O. Box 627, Logan, Utah 84321, USA.

Project No. 122**Title of project:**

Application of Instructional Technology to Problems in
Audiologic Habilitation

Principal investigator:

Dr. Henry Tobin
Dept. of Audiology and Speech
Gallaudet College
7th of Florida Avenue, N. E.
Washington, D. C. 20002 USA

Type of study:

Development of instruments for training

Development of instruments for diagnosis

The project started in July 1975 and is estimated to be
completed in March-June 1977

Type of speech defect:

Hearing impairment

Project result:

The project has resulted in a technical aid/instrument,
which is in regular use

Market introduction is planned for 1977

Manufacturer's name and address:

Educational Microsystems, 18813 Heritage Hill Drive,
Brookville, Maryland 20729

Comments:

I am now also studying the usefulness of a pitch feed-
back device that is wearable. This is intended to be used
for individuals with severe-profound hearing losses who
exhibit high pitched voices. The work is still too preli-
minary to say much beyond this.

Documentation:

Tobin, H: The Programming for Audiologic Habilitation.
Department of Audiology and Speech, Gallaudet College,
Washington DC 20002, Leaflet presented at The Scien-
tific Exhibit. ASHA Convention, 1975.

Project No. 123**Title of project:**

Pre-Speech Assessment Scale: A Rating Scale for the
Measurement of Pre-Speech Behaviors from Birth
Through Two Years

Principal investigator:

Suzanne Evans Morris, Ph. D.
Special Speech Consultant
Demmer-Kiwanis Childrens Division
Curative Workshop of Milwaukee
9001 W. Watertown Plank Road
Milwaukee, Wisconsin 53226, USA

Type of study:

Clinical-Research study to complete the development of a scale to rate behaviors in feeding, respiration, phonation and sound play in early development

Development of instruments for training

Development of instruments for diagnosis

The project started in 1971 and is estimated to be completed in 1979

Type of speech defect:

Geared toward the problems of children with cerebral palsy, mental retardation and other neurological or developmental problems

Project result:

The project has resulted in an instrument (rating scale) which is now being tested in rehabilitation work

Industrial production is planned

Comments:

The Rating Scale is currently being field tested by approximately 50 speech pathologists who have been specifically trained to use it. Filmed studies are being completed of a longitudinal study of 6 normal infants. These studies cover normal development in the areas of the Pre-Speech Assessment Scale

Project description:

The main goal of the project is to develop a clinically valid and reliable instrument for the measurement of pre-speech skills in the young child or the child whose speech development is delayed or defective due to neurological damage.

No materials have been published and it is not possible to release a copy of the Scale at this time. Information will be sent in succeeding years as the program becomes more ready for dissemination.

Project No. 124**Title of project:**

Neurogenic Speech Disorders

Principal investigator:

Ronald Netsell, Ph. D.
Dept. of Communicative Disorders
1975 Willow Drive
University of Wisconsin
Madison, Wisconsin 53706, USA

Type of study:

Statistical and/or need analysis study

Development of instruments for training

Development of instrument for diagnosis

Development of technical aids for personal usage

The project started in 1970

Type of speech defect:

Dysarthrias (speech problems due to nervous system damage)

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

The long term objective of the Clinical Research Center is to develop improved assessment and rehabilitation procedures for individuals with *speech disorders of neurologic origin*. Research is conducted in three major areas, each of which contributes information on the normal or abnormal neuromotor control of speech. (1) Research on normal mechanisms includes studies of the *maturational* of speech motor control in *normal children* and of regulatory systems in the *normal adult*. (2) *Kinesiologic* studies of abnormal mechanisms are designed to reveal the nature of the speech motor problems that accompany neurologic disorders affecting different motor centers of the nervous system. (3) Experiments in speech *rehabilitation* focus on the (a) efficacy of *biofeedback* with selected individuals, and (b) *prosthetic management* of the velopharynx in various neurologic conditions. The methods used to study neuromotor control in all three of these areas include recordings of the acoustic speech signal, structural movements, aerodynamic variables, and muscle action potentials. The data collected from normally developing children, normal adults, and adult neurologic subjects are used to form hypotheses and experimental designs for the study of neurological speech disorders in children.

Project No. 125**Title of project:**

Auto-Com

Madison, Wisconsin 53706
USA

Principal investigator:

Gregg C. Vanderheiden
Trace Center—University of Wisconsin
922 Erb, 1500 Johnson Drive

Type of study:

Development of technical aids for personal usage

The project started in September 1973 and was completed in March, 1976

Type of speech defect:

Non-vocal severely physically handicapped

Project result:

The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Project description:

The Auto-Com is a portable independent communication aid designed for use by non-vocal severely physically handicapped individuals with gross pointing skills.

To use the Auto-Com, the user simply points, using a magnetic hand or head pointer, to squares on the surface which contain letters or words, as he would on a manual letterboard. A unique magnetic sensing system underneath the smooth surface tracks the individual's pointing motions and allows the aid to ignore random motions, such as those associated with cerebral palsy. The pattern of the selection squares may be easily changed to adapt the aid to different individuals.

The Auto-Com is completely self-contained, with a built-in strip printer and optional 32 character LED alphanumeric readout. An external output jack is provided to allow use with a TV display or with an external printer.

With the LED display or TV, the user can backspace and correct mistakes.

The Auto-Com is designed to be attached to a wheelchair and functions as a laptray for working or eating when not being used for communication.

The Auto-Com is now in production prototype form. 40 Auto-Coms are being constructed at the University of Wisconsin and will be placed with individuals in the United States and Canada during 1976.

Size: 61 x 56 x 4 cm.

Weight: 6.5 kg.

Power: Rechargeable batteries, built in.

Documentation:

Vanderheiden, G. C., Raitzer, G. A., & Kelso, D. P.: The Portable Auto-Com/Wordmaster. A Portable Non-Vocal Communications Prosthesis for the Severely Physically Handicapped, Trace Research & Development Center for the Severely Communicatively Handicapped, University of Wisconsin-Madison, Apr. 1, 1976.

Leaflet on The Auto-Com, An Auto-Monitoring Communication Board. Cerebral Palsy Communication Group, University of Wisconsin-Madison, 922 ERB, 1500 Johnson Drive, Madison, Wisconsin 53706, USA.

Project No. 126**Title of project:**

Field Evaluation of the Autocom as an Educational & Communication Aid for Nonvocal Severely Physically Handicapped Children

Principal investigator:

Gregg C. Vanderheiden
Trace Center
922 ERB, 1500 Johnson Drive
Madison, Wisconsin
USA

Type of study:

Development and evaluation of technical aids for personal usage

The project was completed in June 1975

Type of speech defect:

Non-vocal or severely dysarthric individuals

Project result:

The project has resulted in a technical aid/instrument, which is in regular use

Industrial production is planned

Market introduction is planned for 1977

Patent No.

3854131

Comments:

Please send specific program inquiries to:

Deborah Harris-Vanderheiden
Trace Center
(address same as above)

Documentation:

Harris-Vanderheiden, D. and Schutz, R.: Field Evaluation of the Portable Auto-Com, Summary Report. Trace Research & Development Center, October 8, 1975.

Project No. 127**Title of project:**

Versicom

Principal investigator:

Gregg C. Vanderheiden
Trace Center—University of Wisconsin
922 ERB, 1500 Johnson Drive

Madison, Wisconsin 53706
USA

Type of study:

Development of technical aids for personal usage

The project started in January 1975 and is estimated to be completed in September 1977

Type of speech defect:

Non-vocal severely physically handicapped

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

Industrial production is planned

Market introduction is planned for 1977

Project description:

The Versicom is a portable independent communication aid intended for use by those non-vocal severely physically handicapped who do not have sufficient pointing skills to operate the Auto-Com.

In this aid, the user selects characters, (or whole words or sentences) from an 8 x 8 matrix of backlit squares. The system is microprocessor based, and can be programmed to implement any selection scheme which uses 1 to 8 input switches. Some expected modes of operation are: conventional 1-switch scanning, 2-switch step-scan, 4-switch-3 step code, and 8-switch-2 step code. The user has complete control over the aid, including scanning speed and on/off.

The set of selections available to the user is expandable by means of the "word-master" feature. To indicate a wordmaster selection, the user chooses a "level," and then chooses the proper square in that level.

Output devices are the same as the Auto-Com: miniature built-in strip printer and ASCII output jack are standard; options are the 32-character alphanumeric LED readout, and transmitter (for use with a remote character generator and TV display). With the LED display or TV, the user can backspace and correct mistakes.

The Versicom is designed to attach to a wheelchair lap-tray, with the display tilted up to face the user. The display can be tilted down when a flat laptray is desired. Alternately, the unit can be used alone (on a table, etc.).

The Versicom is now in first working prototype form. Funding has been obtained for field testing and final modifications of the design over the next 18 months.

Size: 17.5 x 5.7 x 56 cm.

Weight: 5 kg.

Power: Rechargeable batteries, built-in.

Project No. 128**Title of project:**

Low Cost Scanning Communication Aid

Principal investigator:

Gregg C. Vanderheiden
Trace Center—University of Wisconsin
922 ERB, 1500 Johnson Drive
Madison, Wisconsin 53706
USA

Type of study:

Development of technical aids for personal usage

The project is planned to start in June 1976

Type of speech defect:

Non-Vocal Severely Physically Handicapped

Project result:

The project has resulted in a technical aid/instrument,

which is planned to be tested in rehabilitation work when a prototype is developed

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

The purpose of this project is to develop a scanning type communication aid for use by non-vocal non-pointing severely physically handicapped individuals. The aid will be designed for use with letter, word, or symbol (e. g. Bliss Symbols) communication systems.

The aid will be designed to be very compact and completely portable. Preliminary design specifications call for an aid which will be approximately 30 cm x 25 cm x 6 cm and will present approximately 100 selections with a backlighted display. The aid will be controlled by one switch with the option of using two switches.

Project No. 129**Title of project:**

Simple Low Cost Communication Techniques and Aids

Principal investigator:

Gregg C. Vanderheiden
Trace Center—University of Wisconsin
922 ERB, 1500 Johnson Drive
Madison, Wisconsin 53706
USA

Type of study:

Development of technical aids for personal usage

The project is planned to start in 1976-77

Project result:

The project has not resulted in a technical aid/instrument

Project description:

The purpose of this project will be to field test existing simple techniques and aids (such as letterboards, encoding charts and rotating pointer aids), modify the existing techniques where necessary or develop new ones, and document the different techniques in a form which

would be useful to teachers and clinicians. Documentation of the various techniques and aids located or developed would be in the form of brief descriptive brochures, including plans for construction and modification of the simple aids.

Project No. 130**Title of project:**

- 1) Audiovisual Methods of Speech Rehabilitation
- 2) Pletysmographic Method of Studying Words' Semantic Relations in Aphasia

Principal investigator:

Prof. Tsvetkova, L. S., Psychological Department of Moscow University, 18 Marx avenue, Moscow K-9, USSR

Type of study:

- Project No. 1 development of instruments for training
Project No. 2 development of instruments for diagnosis
Project No. 1 started in 1972 and No. 2 in 1976

Type of speech defect:

Aphasia

Project result:

- Project No. 1 has resulted in a technical aid/instrument, which is in regular use
Project No. 2 has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Market introduction is not planned

Project description:

1. Audiovisual methods of speech rehabilitation, use cinema and tape-recorder to unify different brain systems in various combinations and different speech levels during rehabilitation process. These methods give the aphasic patient an opportunity to control his own speech, to compare it with the normal one and to correct mistakes. Special methods are proposed, favouring restoration of speech understanding, oral speech and of reading in aphasia. Theoretical foundations of these methods and its practical applications are described in the book (in russian).

Tsvetkova, L. S. (ed.): "Problems of aphasia and speech rehabilitation", Moscow University Press, 1975, pp 152-176.

2. Pletysmographic method was used to study semantic relations of words in aphasic patients. The method permits to precise diagnosis of different kinds of aphasia. It can be also used in rehabilitation of words' semantic connections in aphasia.

Project No. 131**Title of project:**

Light Operated Communicator with Electrical Typewriter

Principal investigator:

Nebojša Ivančević,
Center for prosthetics SRS
V. Putnika 7, 11000 Beograd,
Yugoslavia

Type of study:

- Development of technical aids for personal usage
The project was completed in 1975

Type of speech defect:

Quadriplegia, CP, vocal obstruction

Project result:

- The project has resulted in a technical aid/instrument, which is now being tested in rehabilitation work
No industrial production is planned or ongoing

Documentation:

Ivančević, N. and Ivanović, K: Light Operated Communicator with Electrical Typewriter. Institute of physical medicine and rehabilitation SRS, Center for prosthetics, Beograd, Yugoslavia, March 1976.

Project No. 132**Title of project:**

A New Audio-Visual System for the Communication of the Deaf and Mute

Principal investigator:

Prof. Dr. Arsen Surlan, dipl. ing.
Faculty of Electrical Engineering
71000 Sarajevo, Yugoslavia

Type of study:

Development of instruments for training

Development of technical aids for personal usage

The project started in 1971

Type of speech defect:

Deaf and mute

Project result:

The project has resulted in a technical aid/instrument, which shortly is planned to be tested in rehabilitation work

No industrial production is planned or ongoing

Project description:

New technical solutions with a miniature sound generator and a word synthesizer enable deaf-mute people to "speak" their own synthetic language by means of other organs.

Documentation:

Sūrlan, A: A New Audio-Visual System for the Communication of the Deaf and Mute. Faculty of Electrical Engineering, Sarajevo, Yugoslavia. Paper presented at the Speech Communication Seminar in Stockholm. Aug. 1-3, 1974.

Participating Institutions

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Australia		India	
Centre Industries, Alambie Heights	1-5	Tata Institute of Fundamental Research, Bombay	31
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